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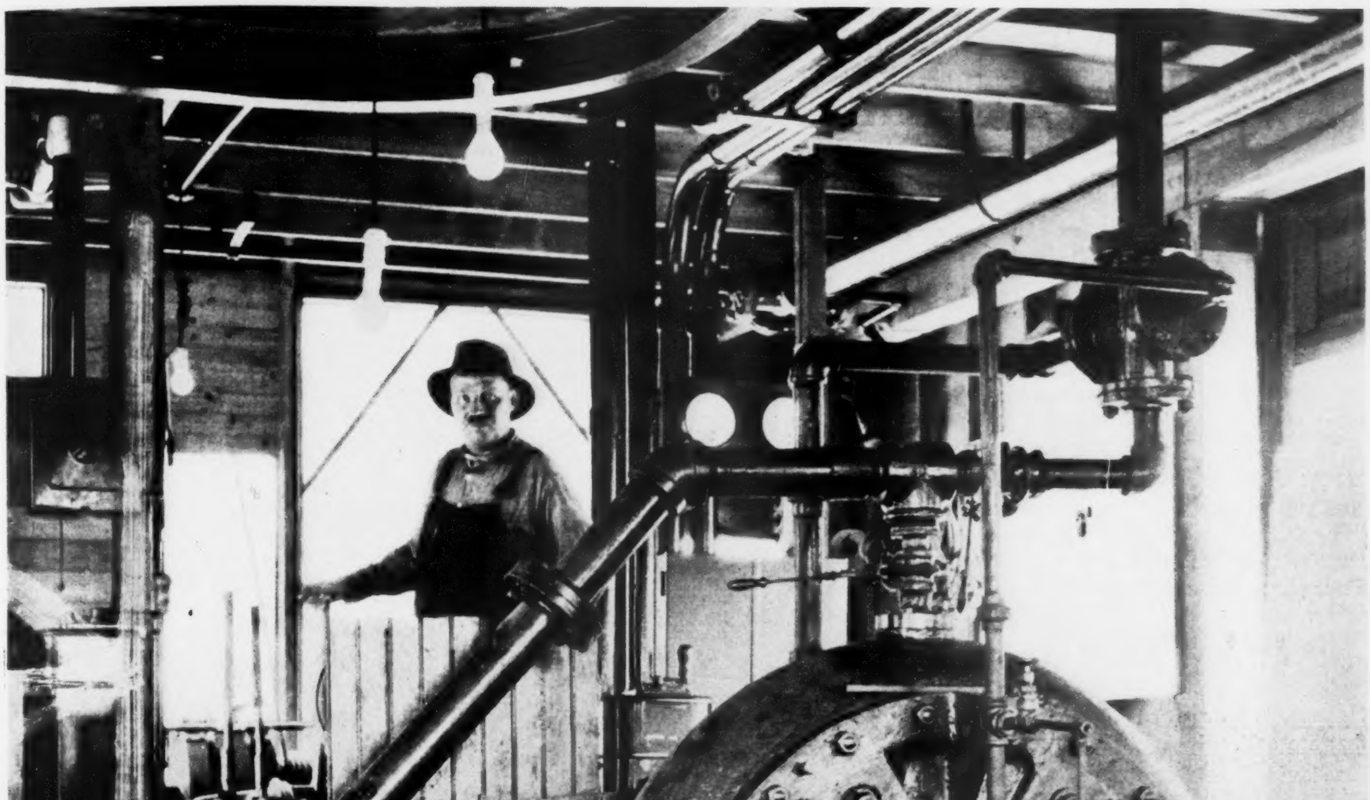


Control room of the Cleveland Builders' Supply Co. dredge, Cleveland, Ohio

Sand Plants South of Cleveland, Ohio, Show Growth and Development

Small Plants Starting as Bank Operations Have Added Washing Plants and Batchers

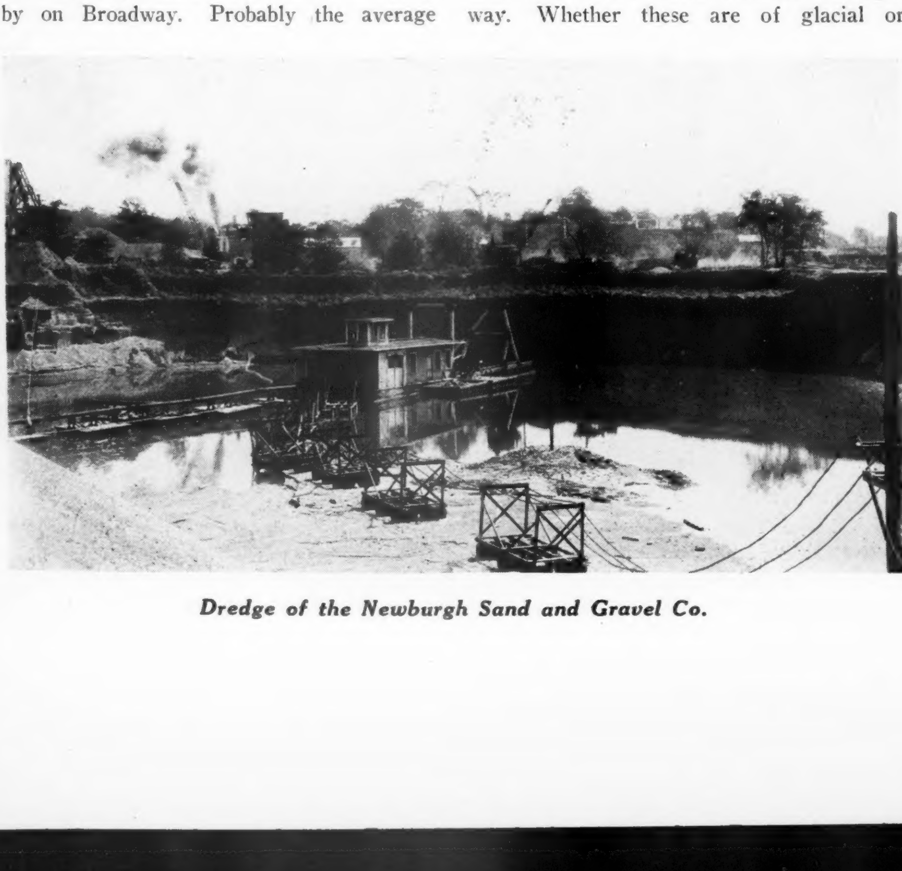
By Edmund Shaw
Editor, Rock Products

JUST south of Cleveland, Ohio, on Broadway, the main highway to Bedford and Akron and on the electric line that connects these with the larger city, there is a sand and gravel district that has developed in an unusual manner. Instead of a single overshadowing plant, there are eight plants, none of which has a very large output but of which the greater number have modern equipment and are excellent examples of how a small tonnage operation should be run. Almost all of them have had the same history, in that they started as bank operations and, as the business grew, added washing plants and better excavating methods. Side lines, such as the handling of building materials, the batch delivery of aggregates and mixed concrete and lime mortar plants, have been added in some cases and the tendency has been to produce more special products, so that plain building sand, the first product of the business, is now only one of half a dozen that are sold.

Practically all the material produced or sold is delivered by truck. Only one plant makes regular railroad shipments and another ships by rail occasionally. But all of them keep fleets of trucks busy so that at almost any moment of the day one may see a heavily loaded sand truck thundering by on Broadway. Probably the average plant production would be something under 500 tons per day, but when the output of eight such plants is loaded into 5-ton trucks and sent over the highway it makes an imposing procession.

Washing plant and deposit of the Newburgh Sand and Gravel Co.

The ground worked is a series of low hills which are on both sides of the highway. Whether these are of glacial or lacrustine origin the writer cannot say, but the material looks like that of glacial deposits which have been washed and sorted by the action of waves or streams. By far the greater part of it is sand, while there are wide variations in the character of the ground, the whole will not average more than 20% of gravel, according to the estimate of one who knows the deposits well. The banks worked vary greatly in height; in some places there is 100 ft. or more of good material, while in other places there may not be more than 40 or 50 ft. The strata in one deposit show a decided dip, in other places they appear to be flat. The material everywhere runs below water level and pump dredges are used at all the larger operations. The ground has to be stripped and the overburden varies from a foot or two to 15 to 20 ft. (in one case noted).



Dredge of the Newburgh Sand and Gravel Co.

Perhaps the strongest reason for there being a number of small tonnage plants in this locality is that the hills are not in a continuous range. Acreages are comparatively small and in several instances the deposits are on land that connects with the site of an industrial plant, the railroad or residential property too valuable to be de-

Washing plant, Newburgh Sand and Gravel Co.

Loading the batcher at the Newburgh Sand and Gravel Co.

stroyed for sand and gravel recovery. But while the reserves are limited, there is enough at the present rate of production to last for several years, a highly important source of building material at the door of one of the fast growing cities of the country. And as the steel furnaces of Cleveland produce a great deal of slag for coarse aggregate, it is fortunate that the sand to use with it in making concrete is found in these hills.

Competition has been keen and there has been a great deal of experimenting and adapting plants to local conditions. Hence the district is full of interest to other producers and those who are interested in sand and gravel in a general way.

Newburgh Sand and Gravel Co.

The Newburgh Sand and Gravel Co. is the first operation that one comes to on the way out from Cleveland, at Stop 2, on the A. B. C. electric line. It is one of the oldest, for it has been in business for about 20 years. Originally started as a bank sand producer, it has, in recent years, installed a dredge and a washing plant and now produces only washed material. Most of the other concerns produce both washed and unwashed sand, but the Newburgh deposit is of coarser material than the others so that brick and plastering sand cannot be taken out without robbing the concrete sand of its needed fines. The whole output has a higher proportion of gravel than that of practically all the other plants in the district or locality.

There is about 3 ft. 6 in. of overburden on the ground now worked and this is stripped by a McMyler Interstate locomotive crane which loads the dirt into trucks. The stripped ground is worked with a dredge, the water level being 50 to 60 ft. below the surface.

The dredge has a well built timber hull on which is mounted a 10-in. American Manganese Steel Co. pump, direct-connected to a 250-hp. General Electric motor. The suction is protected from large stones by a Swintek traveling suction screen. At the washing plant the dredge discharge goes first to a screen box that takes out the stones over 2½-in. diameter. These are not crushed but

Plant of the Cuyahoga Sand and Gravel Co., adjoining the Newburgh property

Deposit and dredge, Cuyahoga Sand and Gravel Co.

Dry-screening brick sand, Cuyahoga Sand and Gravel Co.

Two washing plants in series at the Cuyahoga Sand and Gravel Co.

Wet mixed lime mortar plant of the Cuyahoga Sand and Gravel Co.

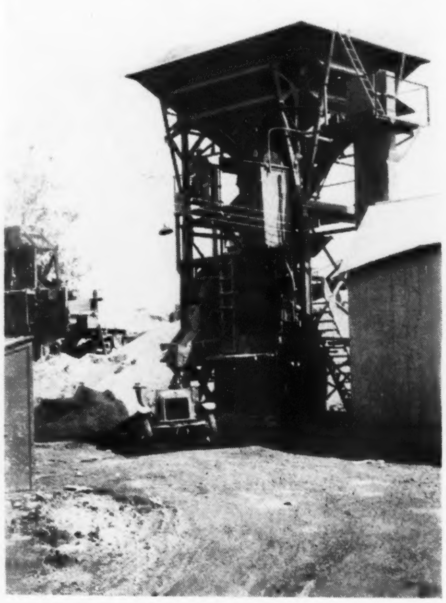
it is intended to add a crusher later. From the screen box the stream is divided between two lines of Stephens-Adamson Gilbert screens, making three sizes of gravel. The sand and water flow into a long sand box with hand operated valves. Automatic sand settlers are in place, but the long box is preferred for the present operating conditions.

All the products are discharged on the ground, instead of into bins, and they are placed in storage piles by an Ohio locomotive crane with a 1½-yd. Williams bucket. This crane also handles the slag that is sold by the company out of cars and it fills the truck loading hoppers and a Johnson batcher. A considerable part of the sand output is delivered through this batcher with either gravel from the plant or slag as the coarse aggregate.

The office of the Newburgh Sand and Gravel Co. is at the plant and Charles De More is the manager.

Cuyahoga Sand and Gravel Co.

The ground of the Cuyahoga Sand and Gravel Co. adjoins the Newburgh company's ground. The Cuyahoga operation belongs to the Ohio Building Material Co., and a central concrete mixing plant and a Blue Diamond mortar plant are on the ground, both using sand from the sand plant. Washed and unwashed material are produced. The unwashed material is for brick mortar, for there is a demand in Cleveland, as there is in so many other cities, for sand that is "fat" with a little loam or clay. The production of the two kinds of sand is carried on systematically, a Brownhoist locomotive crane, with an Owens ¾-yd. bucket, working part of the bank for brick sand and the dredge the remainder. The brick sand is screened so that the gravel falls into the pond from which it can be pumped by the dredge with the remainder of the deposit. The screening arrangement has a hopper with a feeder below that feeds it over a vibrating screen. The gravel runs off the screen to the pond and the sand falls into the boot of an elevator that raises it to a stockpile. The same crane loads the sand out of the stockpile into trucks.



Ready-mix concrete plant, Cuyahoga Sand and Gravel Co.

Office and screening plant, Lytle Bros.

The lower part of this deposit contains a stratum of fine sand that is of excellent quality to use in lime plaster and this is used in the mixed mortar plant and sold for plastering.

The dredge for washed material has a Morris pump direct-connected to a 250-hp. General Electric motor. There is a Diamond cutter to protect the suction from the too large pieces. The pump discharge goes to an unusual washing plant. It is in two sections; the first has a large screen in the box that receives the pump discharge, for taking out oversize, followed by gravity screens. The sand passing the screens goes to settling boxes which are discharged on the ground; the gravel goes to an Eagle gravel washer. From the washer the gravel goes on an 18-in. belt about 50 ft. long to the second section of the plant. This has a sizing screen of Pettibone Mulliken Co. make placed over a set of bins. More sizes of gravel are made in the other plants, as ⅜-in., ⅝-in., ¾-in. and 1-in. sizes are regularly stocked.

The plant products are stockpiled and loaded out by an Ohio crane with a 1½-yd. Williams bucket.

The office of the company is at 1276 West Third street, Cleveland. J. M. Truby is manager.

The Lytle Bros. Plant

Lytle Bros. have the next plant on the same side of Broadway as the plants just described, and like these it produces washed and unwashed material. A McMyler crane with a 1¼-yd. Owens bucket is used to dig the bank sand. A smaller crane of the same

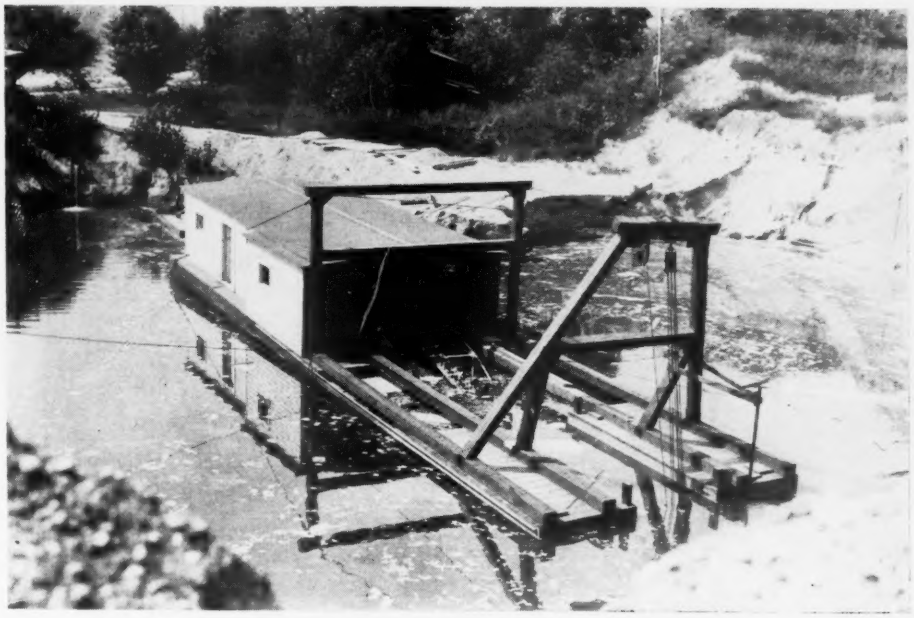
make, with a smaller bucket, is used for loading trucks and handling material in and out of stockpiles.

The deposit here forms a very high bluff and on some parts of it the overburden is deep. This is stripped with a steam shovel and trucks.

The dredge used for producing the material that goes to the washing plant has a Morris pump with a 10-in. discharge, which is direct-connected to a 250-hp. General Electric motor. The discharge goes to a shore plant and first enters the usual screen box where the force of the discharge is broken and the oversize taken out. From this the discharge is split into two Gilbert screens that take out the gravel. The sand is settled in a long box with hand operated valves. The sized products are collected in bins.

For separating the finer sand, used for brick mortar and plastering, a Hum-mer screen is used. This is set in a frame under a hopper, which is filled by one of the locomotive cranes mentioned with bank material. The gravel falls to the ground on one side and the sand falls on the other.

Beside this screen, gravity screens mounted in about the same way, are used for making special sands of either washed or unwashed material. The screens and mountings are arranged so that they can be moved by the crane which feeds them.



New dredge of the Broadway Sand and Gravel Co. Note the standpipe at the extreme left where discharge goes under the highway

The office of the company is at the plant which is at Stop 3 on the A. B. C. railway. J. M. Lytle and W. C. Lytle are the owners of the business and are its managers.

Broadway Sand and Gravel Co.

The Broadway Sand and Gravel Co. has its dredge on the same side of Broadway as

Lytle Bros. dredge and washing plant

Screening bank sand at Lytle Bros.' operation

Plant of the Broadway Sand and Gravel Co.—especially designed to keep down the lift of the pumps

Loading trucks from the stockpiles at he Broadway Sand and Gravel Co.

New dredge of the Cleveland Builders Supply and Brick Co.

the plants described but about a quarter of a mile further on. The washing plant office and loading equipment are on the other side of the road. The whole operation was formerly on the same side of the road as the washing plant, but the ground there has been dredged out.

The new ground is being worked by a dredge that was built in April of this year which pumps to the old dredge in the pond on the abandoned ground. The two dredges are separated only by the width of the highway, and the new dredge has its discharge pipe connected into the suction of the old dredge pump, which therefore acts as a booster. There is perhaps a thousand feet of discharge pipe altogether.

The new dredge has a 10-in. pump, made by the American Manganese Steel Co., direct connected to a General Electric motor. The suction of the dredge is protected from the entrance of large stones by a Swintek travelling suction screen.

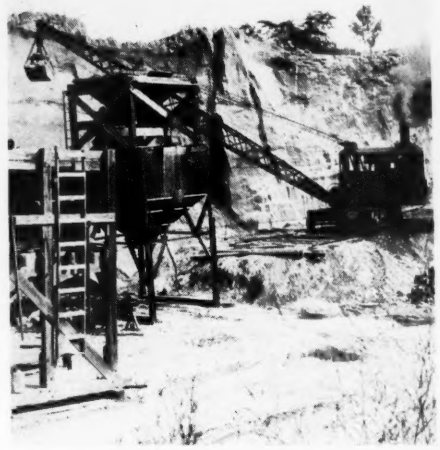
The bank is sluiced as well as dredged and the sluicing pipe is carried on a vertical pipe which is erected on the front end of one of the pontoons which supports the Swintek cutter. A 4-in. Morris pump and motor set supplies water to the sluicing nozzle.

A vertical pipe rises from the discharge pipe of the pump where it goes under the road. This acts as a steady head and does some dewatering of the primary pump discharge. It also tells the pump man whether the booster pump is working as it should or not.

The washing plant is unique as compared with the other plants of the district. It was quite evidently designed to save height so as to lower the head against which the pump must work. The pump discharge goes to the usual screen box and then to two Gilbert screens, and the sand passing through these may go to two chain drags or be directly settled in bins. This much of the plant is set 12 to 15 ft. above the ground and supported on posts, and this is all the elevation against which the pump must work.

On either side of this central portion are the bins, two for gravel and one for sand on each side. The sand bins are about 44 x 36 ft. and the gravel bins are 12 x 24 ft. The tops of all the bins are about 4 ft. above the ground. The sand bins are provided with overflows to take off the excess water. From these bins the products are taken by a Brownhoist crane with a ¾-yd. bucket and placed in stockpiles.

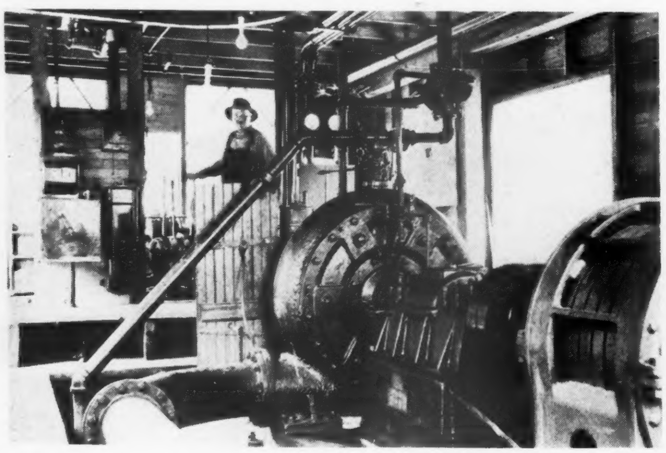
This is a well planned operation and there are several point of interest to other sand producers. One is the position of the booster pump. It is not placed half-way down the discharge line, as is the usual practice, but quite near the primary dredge. In this position it acts as the second stage of a two stage pump rather than like an ordinary



Crane, dry screen and truck bins at the Diamond Sand and Gravel Co.

booster. There is some loss of efficiency due to the higher pipe line velocity needed to send the material through a long line, but this had to be put up with as there was no other position for the booster on account of buildings interfering.

The unusual design of the washing plant is good, in the way the head room has been kept down. Confining the material in low bins is an advantage over letting it run on



Interior of dredge, Cleveland Builders Supply and Brick Co.

Stockpiling sand, Cleveland Builders Supply and Brick Co.

Steel truck bins and screening frames, Fred J. Schmidt Sand and Supply Co.

Office and warehouse of the Fred J. Schmidt Sand and Supply Co.

the ground in that drainage can be better provided for and the space occupied is less.

The post office address of the company is Bedford, Ohio, although the office is at the plant, at Stop 5, Charles Komerack is manager.

Cleveland Builders Supply and Brick Co.

On the west side of Broadway are three plants producing screened but unwashed sand and one which produces washed material. This is the plant of the Cleveland Builders Supply and Brick Co., the largest concern producing and dealing in building material in Cleveland. The dredge of this company has been built quite recently and it is admitted to be the finest dredge in the field, so it will be described in some detail.

Crane excavating plant site, Fred J. Schmidt Sand and Supply Co.

The hull is substantially constructed of timber and a well built cabin covers the machinery. In the forward part of the cabin is a three-drum Mundy hoist, one drum for handling the suction and two for the lines by which the dredge is moved ahead and from side to side. The main pump has a 10-in. discharge and was made by the Morris Machine Works. It is direct connected to a 200-hp. General Electric motor. An unusual feature for this district is the use of spiral riveted pipe for a discharge pipe. This is carried to the shore on wooden pontoons.

The bank is very high above the water where the dredge is working, and sluicing has to be practiced as a measure of safety as well as economy. The sluicing nozzle is a regular hydraulic "monitor," mounted forward of the cabin on the hull. Water for it is supplied by a Morris 6-in. pump which is direct-connected to a 40 hp. General Electric motor. This same pump also serves to prime the main pump.

The plant to which the discharge is sent is a simple arrangement of gravity screens and a sand box. By far the greater part of the output is sand and shipments are made by both trucks and railroad cars. The output is considerably greater than that of any other plant of the district.

Two Orton tractor-wheel cranes with Owens buckets are used to handle the material in and out of stockpiles and the load cars and trucks.

The office of the Cleveland Builders Supply and Brick Co. is in the Leader building, Cleveland, and this operation is only one of a number of sources from which is receives concrete sand and other sands.

Diamond Sand and Gravel Co.

Of the operations producing screened bank sand and gravel, all on the west side of Broadway, the oldest is that of the Diamond Sand and Gravel Co. This was described in detail in Rock Products, issue of July 14, 1923, in an interesting article by Alexander W. Schmidt, the present head of the business. At that time the business was conducted by a corporation, of which his father J. H. Schmidt was president, composed of all the members of the family. Now J. H. Schmidt has retired from business and another son, Fred J. Schmidt, has established himself in the sand business on ground a short distance away.

At the Diamond plant the sand is dug with an Ohio locomotive crane and 1-yd.

Loading screening bins, Diamond Sand and Gravel Co.

Owens bucket which lifts it to the hopper of a portable screening plant. This contains a single-deck Hum-mer screen placed over bins from which trucks may be loaded. Another screen of the same kind is arranged so that the products fall either to the ground or into trucks.

That is not much change in the equipment from that described in the article referred to, which contains an excellent tabulation of all the items entering into the cost of screening.

The office of the company is at the plant and the post office address is Bedford, Ohio.

Fred J. Schmidt Sand and Supply Co.

The Fred J. Schmidt Sand and Supply Co., conducted by another of the sons of J. H. Schmidt, is producing only bank sand at the present time, but it is a very up-todate operation of its kind. Only steel was employed in constructing the plant units and the loading bins, of which there are five, are of a standard type, made by the Butler Manufacturing Co., Waukesha, Wis.

The sand is dug by an Ohio locomotive crane with a 50-ft. boom and a 1-yd. Owens bucket. There are four Hum-mer screens placed over the bins from which the trucks are loaded. The crane keeps the hoppers full so that a truck is never more than three minutes in leaving the plant office, taking its load in the pit and returning to the office on the way out to the job.

Truck Dispatching Makes for Efficiency

This timing of the trucks is a part of the system that has been worked out by Mr. Schmidt, and it is one of the most efficient systems that has been noted in connection with a rock products industry. It is applied to a fleet of six Autocar trucks that is owned by the company and to other trucks that are hired as they are needed. For some time after the business was begun, trucking operations were carried on in the usual way, which means that no especial superintendence was given them. Then Mr. Schmidt began to check up on truck operation and he found that the time taken for the average trip might be reduced in several ways. One of the important ways was to be sure that bins were always full, ready to load trucks as fast as they came in.

Then each truck was fitted with a service meter which registers the actual time that the truck is on the road. The meter makes a chart which is changed each morning. These charts are studied and compared with the record of what the truck delivered and the known distance which had to be travelled.

The drivers were good men and co-operated in the effort to improve the service, and in a short time the trucks were making seven trips in the same time that six had taken before. Time studies of other parts of the work further cut down the time required. Major repairs to the trucks are made at a regular shop, but it was found a saving of time to employ a good mechanic who could make all minor repairs and adjustments at the plant.

Klass Sand and Gravel Co. produces sand with screen of own design

The office of the company is at the plant and the post office address is Bedford, Ohio.

Plans for the erection of a plant to produce washed material are now being considered.

Klass Sand and Gravel Co.

The Klass Sand and Gravel Co. has a bank sand operation like those just described on ground adjoining that of the Cleveland Builders Supply and Brick Co. It uses a McMyler locomotive crane with a 1-yd. Owens bucket, and the sand dug by this is screened by a dry plant and loaded directly into trucks.

The screens used are vibrators of a peculiar type, which were designed and built at the plant. There are two of them placed back to back under the hopper that the crane fills. The vibrating mechananism is very simple. The frame that holds the screen cloth is suspended at the upper end and rests on a shaft that is driven by a motor. This shaft has a square section where the screen frame rests on it, and as the shaft turns over the corners of this square section lift the screen and let it fall with a bump.

Against Government Entering Private Business

BUSINESS as well as other organized groups sponsoring demands looking to the indiscriminate creation of government bureaus, boards and commissions were denounced by Lewis E. Pierson, president of the Chamber of Commerce of the United States, in an address bringing to a close the two days' conference of directors and councillors of that organization at West Baden, Ind.

Not only has the government encroached upon the field of business, said Mr. Pierson, but business has increased its demands on government until bureaus and commissions have undertaken work that business can adequately do for itself.

"Private business," said the president of the national chamber, "recognizes that no enterprise can be successful except under a single executive head. Throughout history triumviates, boards and commissions have been ineffective in the administration either of government or of industry. Boards and commissions are designed to have advisory capacity but not executive authority.

"We are drifting more and more to legislative action under pressure of special groups —economic, religious, social or sectional— and are forgetting the fundamental principles on which this country was founded. We are pandering to the governmental ideas of the Old World—ideas which have failed through centuries to foster that individual initiative which has made this country the undisputed leader in world progress."

This, Mr. Pierson declared, is an academic matter, but one which most intimately concerns the safety, the stability and the prosperity of every living American.

"We know," he continued, "that before the railroads were restored to private operation, the Railroad Administration accumulated an operating deficit of $1,800,000,000. We know that the government spent $3,000,000,000 for ships during the war, and that in addition to the $120,000,000 a year which the taxpayer is now paying in interest, government operation since the war has resulted in a deficit exceeding $233,000,000.

"Yet these are merely the dollar yardsticks of a national loss that far exceeds the additional burdens that governmental red tape has inflicted upon the taxpayers and rentpayers of the nation. The real loss is the complacent blindness of the American people and their failure to resent the usurpation of their rights when that usurpation continued after peace was declared."

"It is important," he continued, "to preserve American business, but it is far more important to preserve American government.

"We need only look across the ocean to the collapse of commerce and the destruction of liberty in Russia to appreciate the vital truth that proper government is the keynote of the arch of progress.

"If the government finds that it can enter one business without resistance, how long will it be before it extends its operations to all business? And when the government has wormed its way into the whole spread of American trade, the heart will be gone from American business and American government, as our forefathers built it, will have vanished from the earth.

"We must stand on our own feet as business men, meeting our own problems through business organization, stifling any desire for extension of government props to our own business with just as much vigor as we fight the encroachment of government upon any form of industry."

Monroe Plant of the France Stone Co.

Ohio's Largest Producer Uses Experience of 20 Years in the New Michigan Plant

By A. C. Avril and H. W. Schaub
Mining Engineer and Geologist and Mechanical Engineer, Respectively, of the France Stone Co.

TWO years ago, in October, 1925, the Monroe, Mich., crushed stone plant of the France Stone Co., which was well on the way toward producing 1,000,000 tons of stone for that year, caught fire. The plant, being entirely constructed of timber, was destroyed in about two hours. Not one piece of equipment was reclaimable, the crushers were piled in a heap in the quarry, and the screens were a mass of tangled steel.

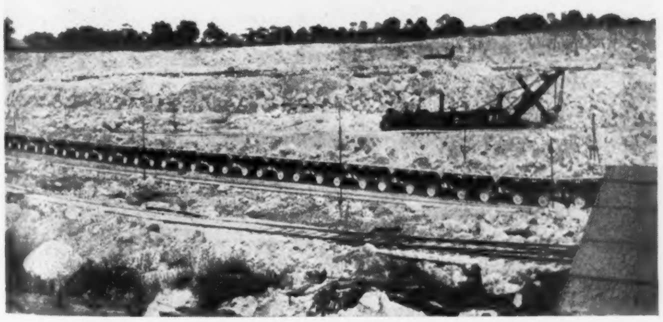
This plant, built in 1915, enjoyed a profitable business for 10 years, and had had such improvements made in it from time to time that when it burned it was in reality a modern plant. The flow sheet shown with this article (last page) gives the mill as it was at the time it burned.

This mill produced a large tonnage of clean stone, but the company, in rebuilding, used an entirely different layout, because it was found that by doing so the operating cost could be materially reduced. After the fire the company began immediately to plan a mill which they believed would be the most suitable for the conditions at Monroe, but before the engineers started work on even tentative plans the entire situation was discussed and the problem was considered from all angles.

Several days before the fire had stopped smoldering the company diamond core drill was at work on the property testing out the available stone reserve. The cores were shipped immediately to commercial laboratories to be tested chemically and physically to see whether or not the reserve consisted of material suitable for the market. Surveys were made of the property to determine the extent of the stone reserve, and estimates of the investment in development work were made for track layout, cost of blasted stone, cost of drilled stone and for other details, in order to make a comparison of the economy of rebuilding at the present site with that of locating on new property. The stone

Looking across the quarry showing the "island" in the center

Looking down the quarry from the plant incline



A long train of loaded cars at the foot of the incline to the crushing plant

Incline to the crushing plant. The shovel is working on one side of the "island"

Top of the long incline from the quarry

reserve and the saving in development work justified staying on the present site.

In designing the mill the company desired to build a plant that was simple in design and of adequate size to take care economically of the estimated future business in its territory. Before a decision was made as to what the proper design should be, 20 distinctly different layouts were submitted for criticism. From these the one used was chosen after thorough criticism and discussion.

Quarry Methods

The quarry opening extends over a roughly elliptical area of about 50 acres. Most of it has been worked to an average depth of 47 ft. at the periphery. There is, however, an island containing probably 400,000 tons of stone in the middle of the hole, which has a face about 20 ft. high. In getting out the stone the two faces are worked. One shovel operates the high bank around the outside and the other operates in the island in the middle.

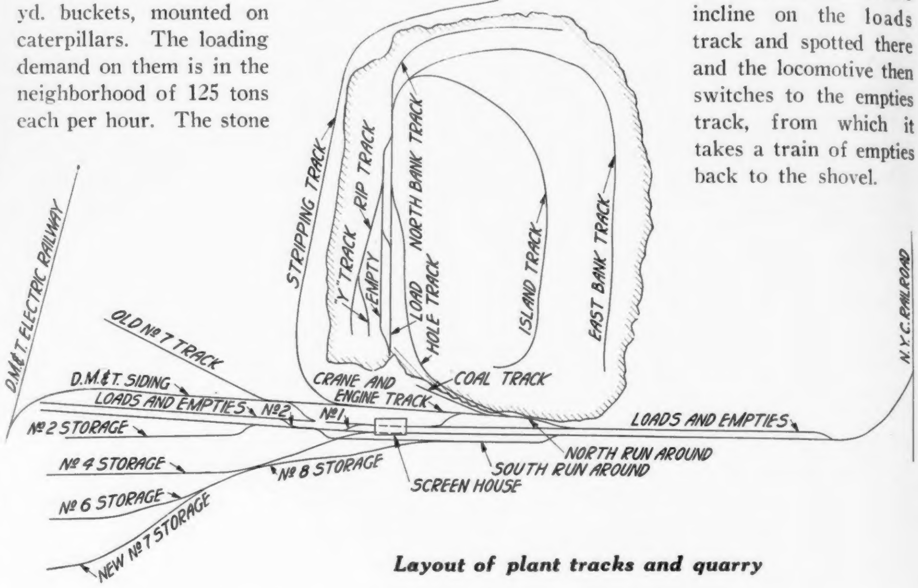
The shovels used for loading are No. 91 Marion shovels with 3½-yd. buckets, mounted on caterpillars. The loading demand on them is in the neighborhood of 125 tons each per hour. The stone is loaded into cars built by the Koppel Industrial Car and Equipment Co.

Specifications for these cars were as follows:

Capacity, level	9 cu. yd.
Capacity, heaped	11 cu. yd.
Gage	4 ft. 8½ in.
Length over coupler pulling faces	15 ft. 1 in.
Wheel base	6 ft. 3 in.
Width	10 ft. 0 in.
Height over all	7 ft. 9 in.

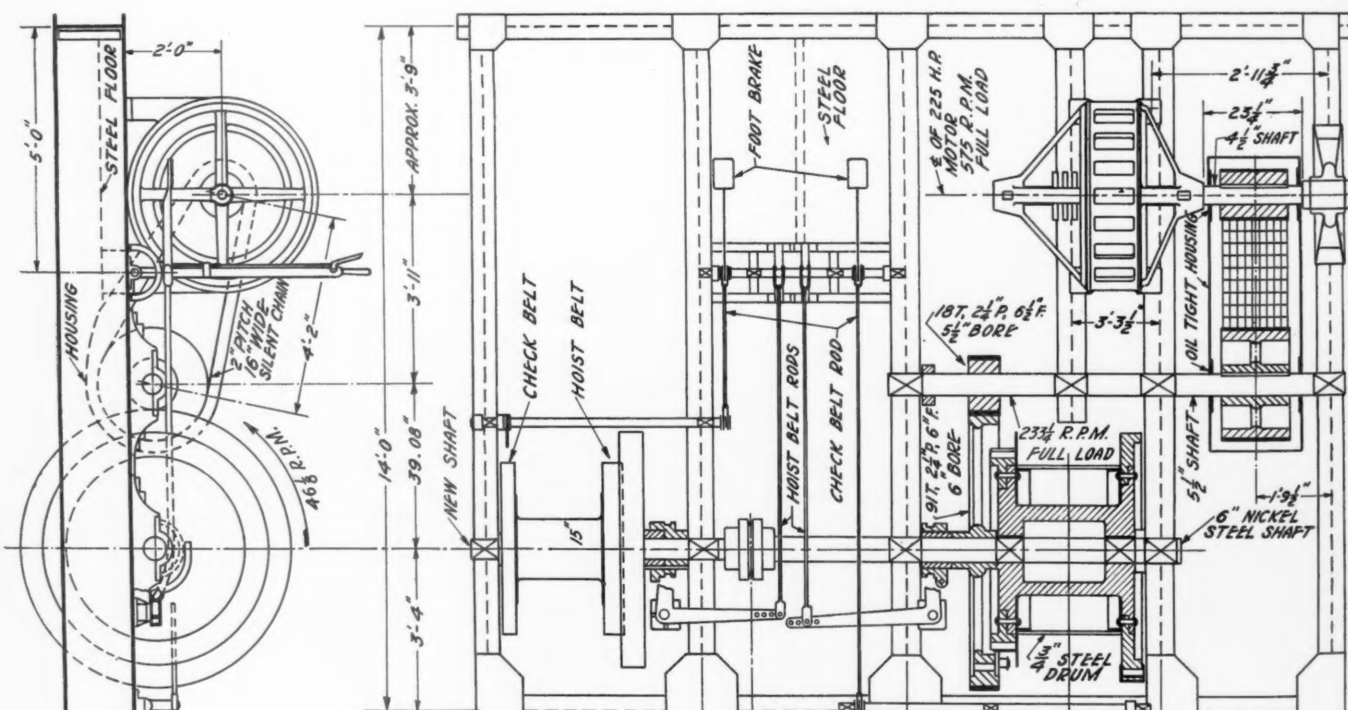
They are arranged to discharge to either side.

To draw the cars, 40-ton Vulcan steam locomotives are used. Loaded cars are drawn to the foot of the incline on the loads track and spotted there and the locomotive then switches to the empties track, from which it takes a train of empties back to the shovel.



Layout of plant tracks and quarry

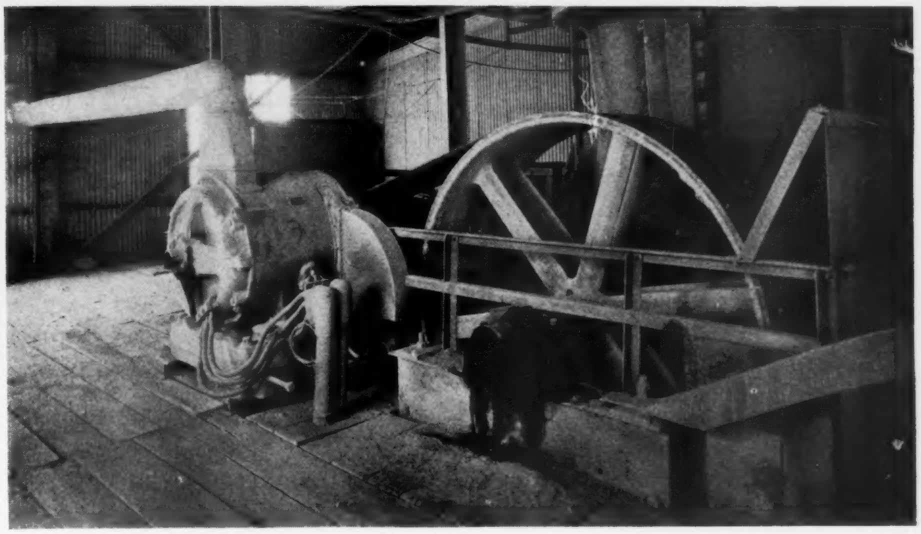
By means of a 600-ft. cable and electric hoist the cars are drawn up a long incline at a 27½% grade to the crusher floor where the grade is reduced to 1¼%. Here they



Details of the hoist which was built in the company's shops

are held by the hoist until dumped with the car dumping hoist. The cars are then returned to the empties track at the foot of the incline.

Cars dumping to the primary gyratory crusher



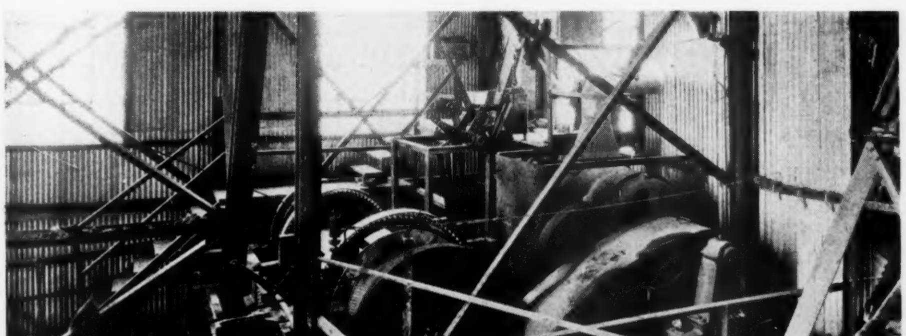
Variable speed motor and short-center rope drive of the primary crusher

Hoist Built in the Company's Shops

The incline hoist is one of the most interesting pieces of machinery in the plant. It is sturdy and well constructed and it was built in the company's own shops at North Baltimore, Ohio.

Electric "stone juggling" hoist operated by remote control

The entire machine was built around the main hoisting drum gear of a No. 91 Marion steam shovel. The drum was enlarged to 42 in. in diameter in order to take care of the size of cable necessary to draw the cars from the quarry hole. A new eccentric was built and attached to the gear, and by means of toggles and lever arms this is mechanically operated by a hand lever located conveniently on the hoistman's platform. The 225-hp. slip ring motor which drives it is connected to the hoist by a Morse silent chain drive. The main drum shaft is extended on the other side through another drum which is used as a car dumping hoist.

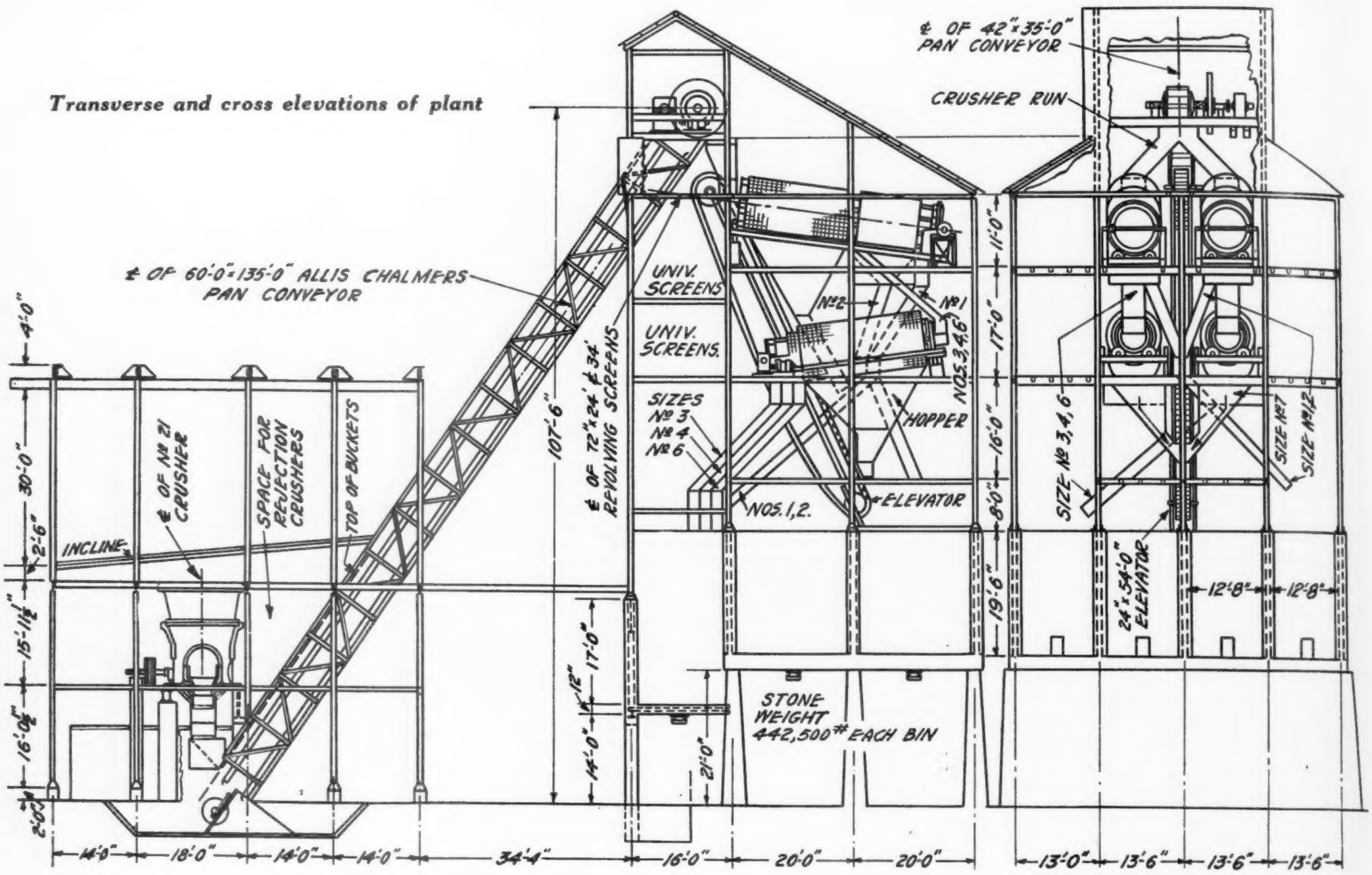


Electric hoist for the incline which was built in the company's shops

The Crushing Plant

After leaving the cars the stone passes through a No. 21 Allis-Chalmers gyratory crusher, which is set to crush the stone to a maximum size of 4½ in. The reason for the crusher being set so close is to minimize secondary crushing and it was possible to do this because of the large capacity of the No. 21 crusher in comparison to the rest of the mill. To obtain the maximum crushing efficiency under the conditions of a rather wet stone, both discharge sides of the crusher are left open, which prevents stone from packing in the chute and blocking the discharge. One discharge side of the No. 21 crusher in the old mill was closed which resulted in the stone packing up in the closed side and interfering with the flow. This necessitated extra labor for cleaning out.

The crusher is driven by a 200-hp. variable

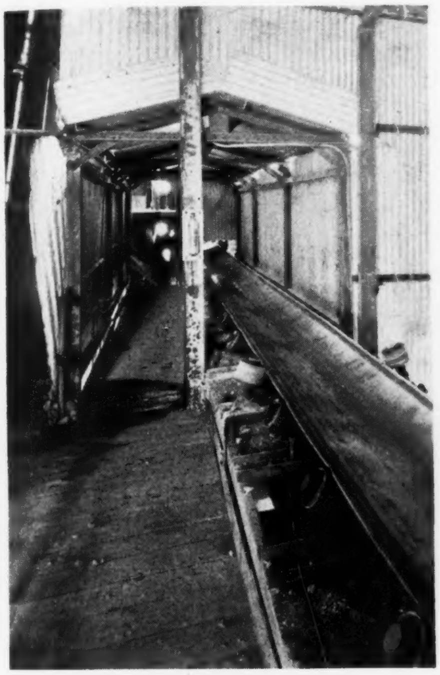


Cross-sections showing primary crusher and screening arrangement

End and side elevations of the plant structure

speed motor, the power being transmitted through a Texrope drive. A variable speed motor is used, to give a range of speeds to govern the rate of the stone passing through the crusher. The desirability of this feature is the ability to slow up the crusher during wet weather, thus allowing stone to pass through slowly into the pan conveyor, thereby reducing the load on the screens and giving a cleaner product than could be produced if the crusher was run at full speed.

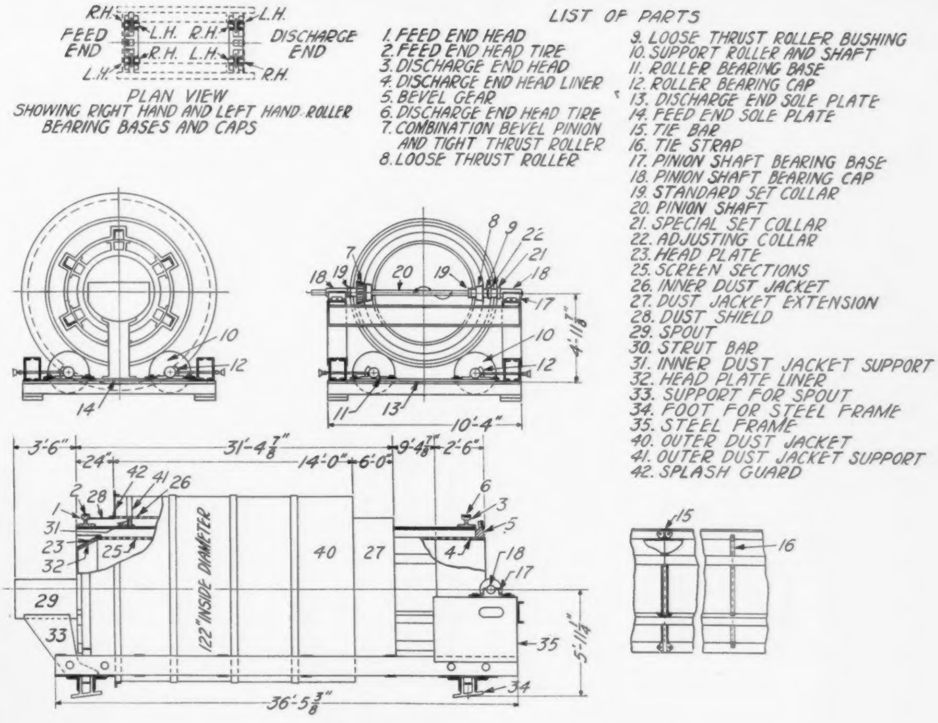
From the No. 21 crusher the stone drops



Conveyor carrying rejections for re-crushing to smaller sizes

into a 42-in. and 135-ft. centers pan conveyor, setting at a slope of 55 deg. 30 ft. and traveling at a chain speed of 93 ft. per minute, which is driven by a 100-hp. motor and a 100 AT Cleveland worm gear speed reducer.

From the pan conveyor the stone flows into two 72-in. by 30-ft. open end revolving



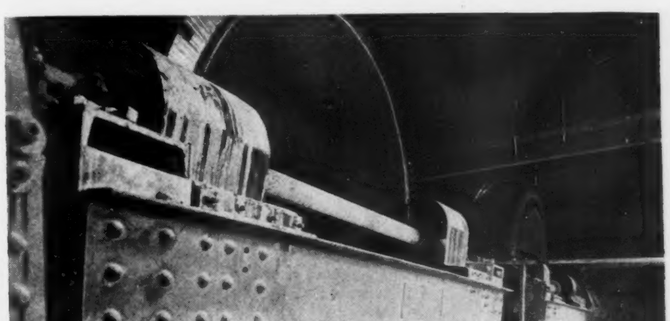
Details of the rotary sizing screens

screens. They are connected to 30-hp. motors by 500 AT Cleveland worm gear speed reducers and maintain a speed of 11 r.p.m. These are equipped with a main section and two outside jackets each. The main sections have, on the receiving end, 22 ft. of steel plate with 3-in. round perforations. Toward the discharge ends they have 8 ft. of steel plate with 4½ in. perforations. The first jackets are 18 ft. long and 96 in. in diamater and are made of steel plate with 1¾ in. perforations. The outside jackets are 14 ft. long and 120 in. in diameter made of wire screen of ¼ in. openings.

The stone passing over the 3 in. openings and through the 4½ in. openings is chuted to the No. 1 bin as a finished product. The stone retained on the 4½-in. screen is returned to the secondary crushers.

That portion which passes through the 3-in. holes and is retained on the 1¾-in. jacket is chuted to the No. 2 bin as a finished product. The material passing through the 1¾-in. jacket and retained on the ¼-in. screen is chuted to the two 60-in. diameter by 24 ft. long open-end revolving screens. Each of these screens is driven by a 20-hp. motor and a Farrell herringbone speed reducer, which gives the screens a speed of 10 r.p.m. The main sections of these screens are covered entirely by steel plate with 1-in. square openings. The first jackets are 84 in. in diameter and 22 ft. long and are made of perforated metal with 1-in. square openings. The outside jackets are 128 in. in diameter and 20 ft. long and are made of wire screen which has ⅛-in. square openings. The stone retained on 1-in. flows through the chutes to the No. 3 bin; that which passes the 1-in. screen and is retained on the ½-in. is chuted to the No. 4 bin; that which passes through the ½-in.

Head of the pan conveyor showing the speed reducer drive



Discharge end of 72-in. by 30-ft. rotary sizing screens

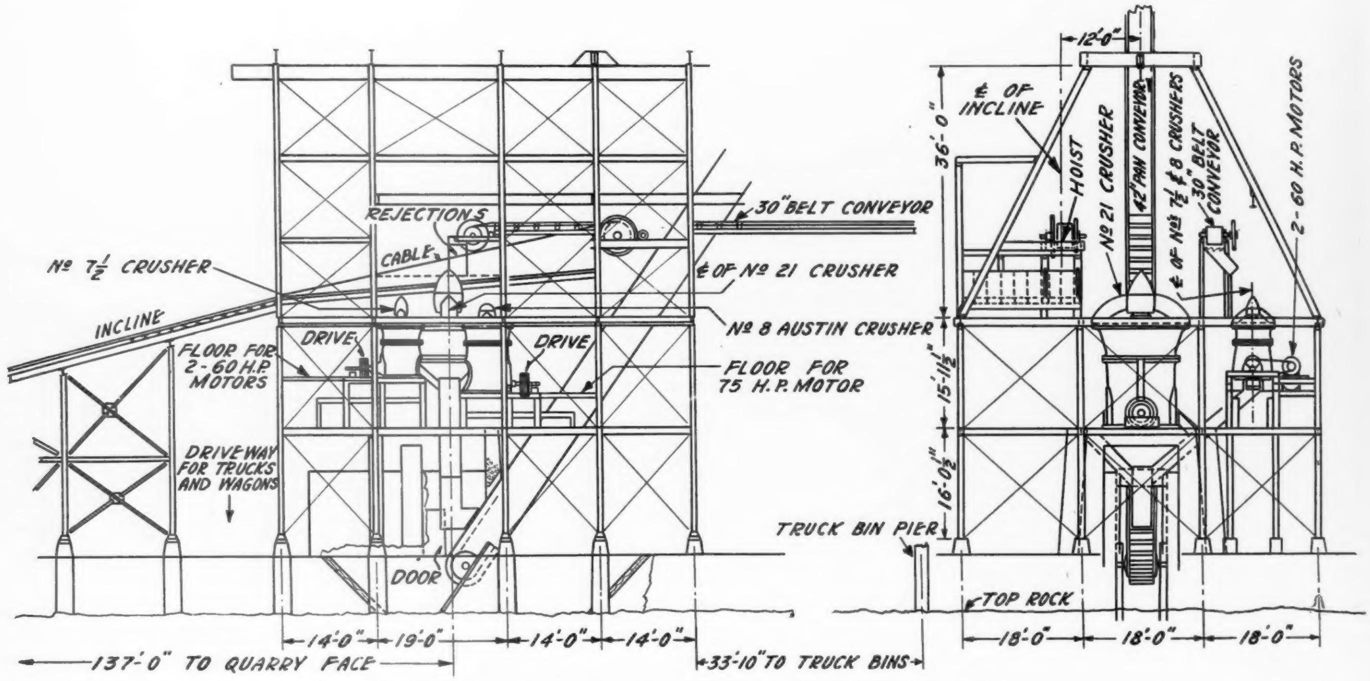
openings and is retained on the ⅛-in. goes to the No. 6 bin. The chutes from all four screens to the bins are so arranged as to permit the mixing of any or all of the various sizes in required percentages.

Should there be an over-production of No. 1 and No. 2 stone the chutes are so arranged that these sizes can be returned, along with the rejections, on a 36-in. belt of 117 ft. centers, which moves at a speed of 250 ft. per min., to the secondary crushers, a No. 7½ McCully gyratory and a No. 8 Austin gyratory. The No. 7½ McCully crusher is driven by a 40-hp. motor and a Texrope drive. The No. 8 crusher (Austin) is driven by a 60-hp. motor and a Texrope drive. Passing through these crushers, the stone drops into the large pan conveyor and is again returned to the large screens.

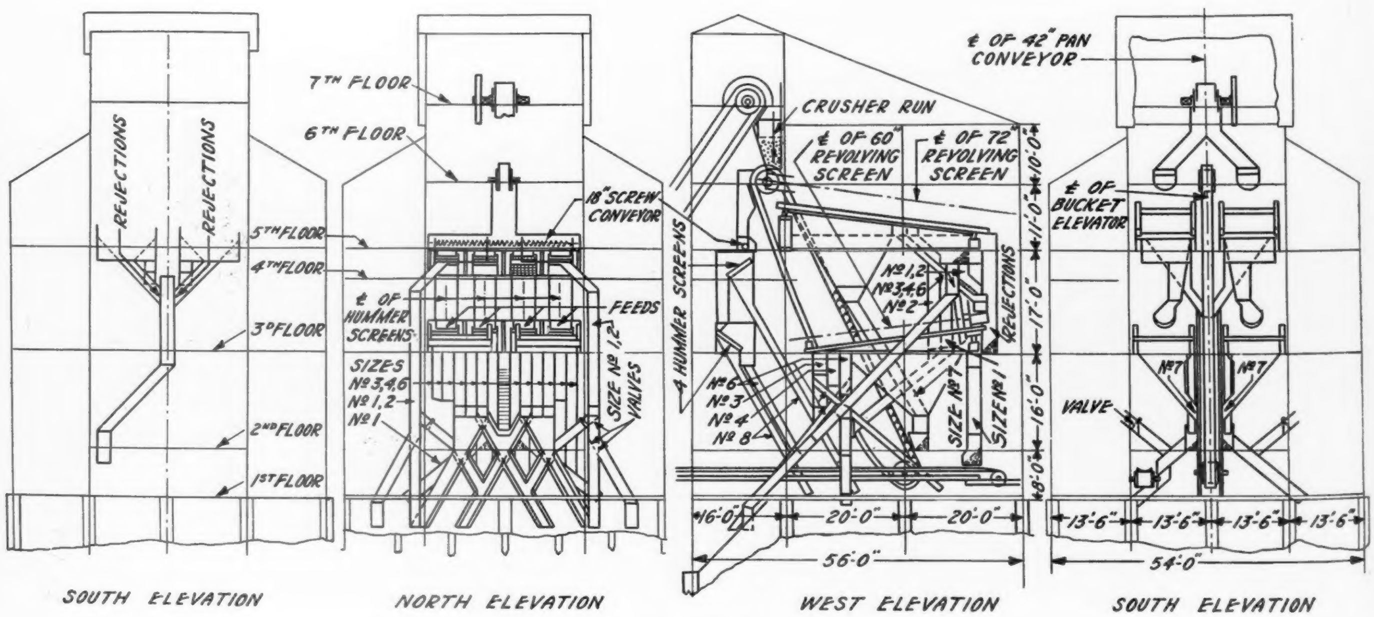
Returning to the products of the 30 ft. revolving screens, the material passing the ¼-in. openings is collected in a hopper from which it is elevated by means of a belt elevator, with 24-in. buckets, to a battery of six vibrator screens which are used to prepare agricultural limestone grading from ⅛-in. down. Each one of these screens are separately driven so that any one of them may be shut down without interfering with the operation of the others.

Small Sizes of Stone are Washed

To improve the cleanliness of the smaller sizes (from 1¾-in. to ⅛-in.) a washing system has been installed. Two centrifugal pumps each of 1000 g.p.m. capacity, driven by 75-hp. motors, directly connected, pump the water through an 8-in. line to the screens. The flow is here divided into two 6-in. streams which are piped into the receiving end of the screens. The pipes are 18 ft. long and are slotted so that the spray falls directly on the upper side of the stone bed in the screen. The water is in a large enough quantity, and has sufficient pressure, to reduce the percentage of the dust in the product to less than ½ of 1%. After passing through the stone the water is caught in an electrically welded hopper, from which it is flumed to a settling tank. To reclaim the small sizes of stone that flow out with



Transverse and cross sections of the primary crushing plant



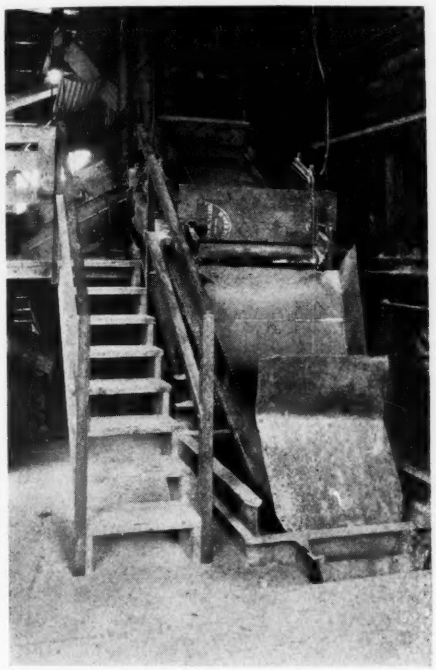
Transverse and cross sections of the finish screening plant

the water, arrangements are being made to install a drag classifier. The material recovered here will make an excellent concrete sand.

Referring to the flow sheet, it will be noted that a Rotex screen is used to wash the stone from ¼-in. to ⅛-in. that passes over the battery of vibrator screens.

Railroad bins have been built over two tracks with four bins to each track. These have a capacity of 225 tons apiece. Each bin is provided with three 24x24-in. bin gates set at right angles to the track so as to draw the bin uniformly. The vertical clearance below the gates is 21 ft.

For truck loading, there are six bins, each of 200 tons capacity. One side of these is supported by an archway having a 27 ft.



Vibrating screens for grading agricultural limestone

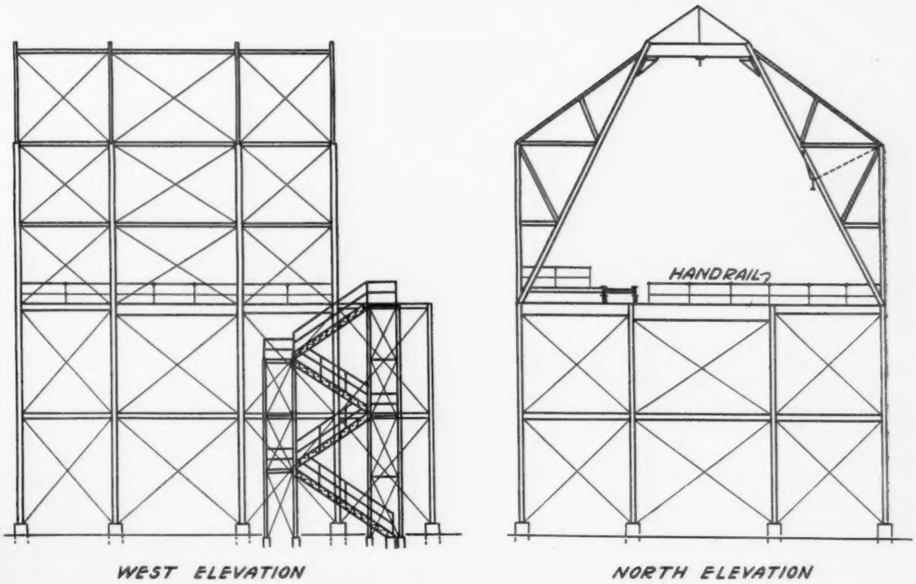
span. This arch permits the trucks to enter from both ends at the same time and leave through the archway. Headroom under these bins is 14 ft. All the bins are made of reinforced concrete throughout.

Construction of Screen House

The screen house is entirely built of steel. All columns are Bethlehem H-sections; girts and purlins are of channel sections; the floor beams are of standard I-beam sections, and the wind braces are of angle sections. The roofing and siding is "Toncan" corrugated iron.

The building is well lighted with Fenestra mill type windows. Four 14x14 ft. Kinnear roller type doors are provided on the upper floors and are to be used to bring repair parts into the mill.

Floors are of 3-in. hardwood. Stairways are made of checker plate and comply in construction with the state code. Railings for the stairways are of standard pipe construction.



Cross sections of the plant structure showing the unusual roof framing

Trolley beams have been placed over the screws and the headshaft of the pan conveyor to facilitate the handling of repair parts. Each trolley is equipped with a hand geared type trolley from which chain falls may be suspended.

Crusher Building

Connecting the screen house to the crusher house is a walkway, supported by the belt conveyor bridge and the self-supporting pan conveyor frame, which has a span of 60 ft. The crusher house is built entirely of steel on concrete footings. In order to have maximum floor space on the crusher floor, A-frame construction was used to support the roof. This eliminated the necessity of having central columns. The No. 21 crusher is set on a concrete base and the No. 7½ McCully and No. 8 Austin are set on steel bases.

Above the No. 21 crusher is a 40-ton trolley beam carrying trolley cars and chain falls to handle repair parts and an electric "stone juggling" hoist. The stone juggler is an interesting piece of equipment. It has remote control and its capacity is 10 tons.

Electrical Equipment

Each piece of equipment is driven by an individual motor. All motors are of the enclosed pipe ventilated, roller-bearing type. There is a fan built in each, which draws clean air from the outside and blows it through the motor keeping it cool. Motors are absolutely dust proof, which eliminates rotor trouble. The motor controls are so interlocked as to start the machinery in proper sequence. The starting sequence is:

1. Water pumps.
2. Vibrator screens.
3. Belt elevator.
4. Belt conveyor.
5. 60 in. by 24 ft. revolving screens.
6. 72 in. by 30 ft. revolving screens.
7. Pan conveyor.
8. Secondary crushers.
9. Primary crusher.

The control is so arranged that when starting in sequence each motor attains full

Electric motor and speed reducer drive of the 72-in. by 30-ft. rotary screens

Storage tracks provide for a large number of cars

speed before the following one starts. This arrangement minimizes the peak load which results in lower power cost than if all were started at once, because power at this plant is purchased on a demand charge basis.

The controls have also been arranged so that during repair work any piece of equipment may be run by itself.

All electrical equipment is protected by overload relays and totally enclosed starting boxes with push button control are used.

The entire mill, storage tracks incline and quarry are electrically lighted to facilitate night operation. Flood lights are used at dangerous places.

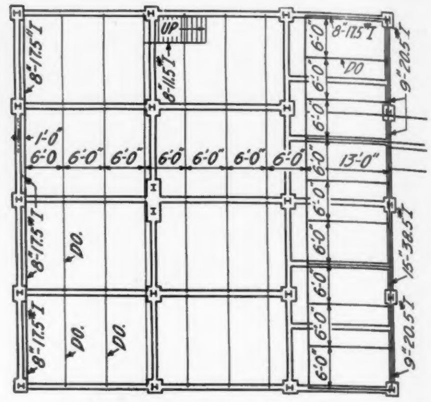
The office is a one-story stucco fireproof building. The floor plan is so arranged so as to provide a large room for the clerks, an office for the superintendent, a conference room, a store rom and a lavatory. It is well lighted and is heated by an Arcola hot water system.

Safety Precautions

The reader has undoubtedly noticed that everything was designed to make working conditions safe and comfortable for the men. The wooden floors were used in preference to steel because they are easier to walk on and add to the mill men's comfort in cold weather.

Railings were provided around all openings and stairways and all parts of the mill are well lighted and ventilated by windows.

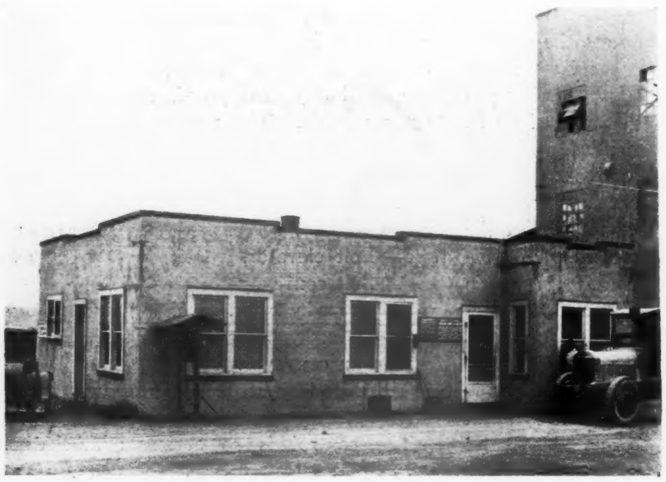
Because of the rigid safety-first rules practiced by the company, there was not one serious accident during the construction of this mill.



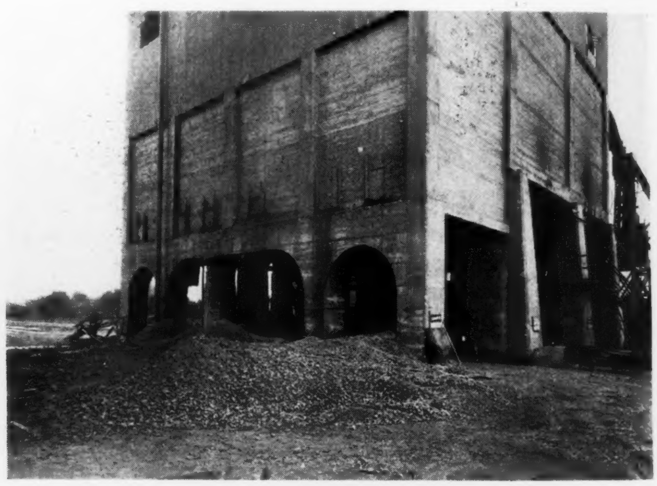
Details of bin framing

Personnel

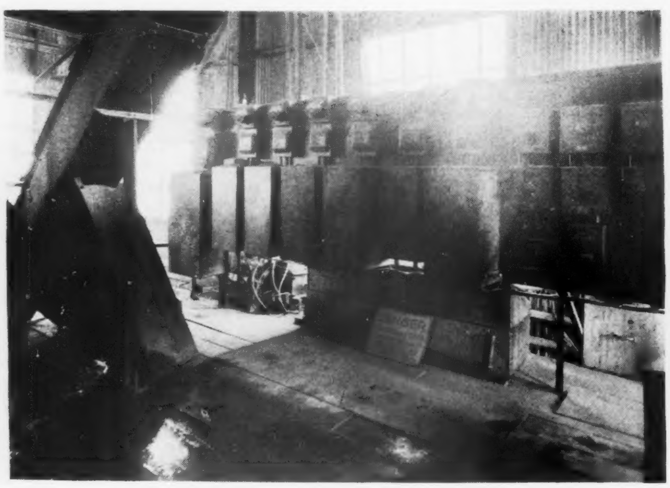
The France Stone Co. operates a number

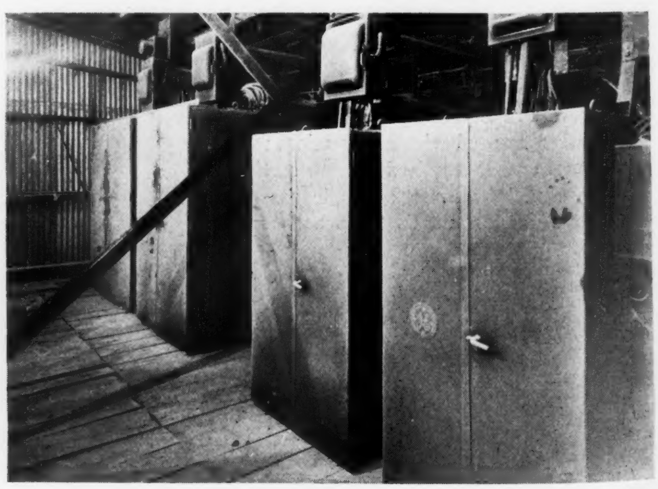


Office building of fireproof construction



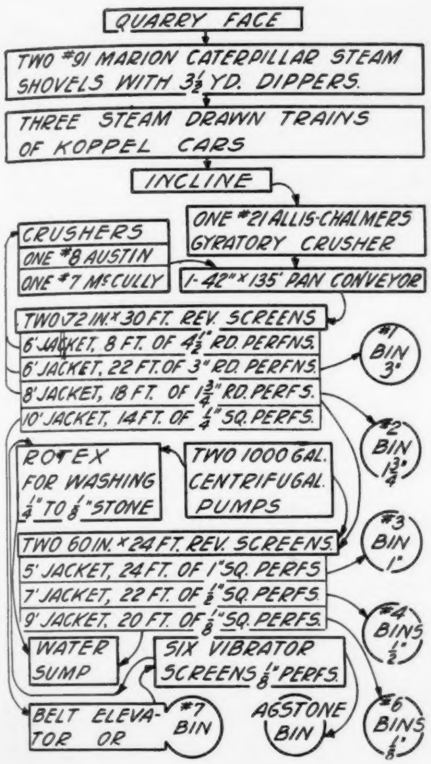
Bins for railroad car and truck loading



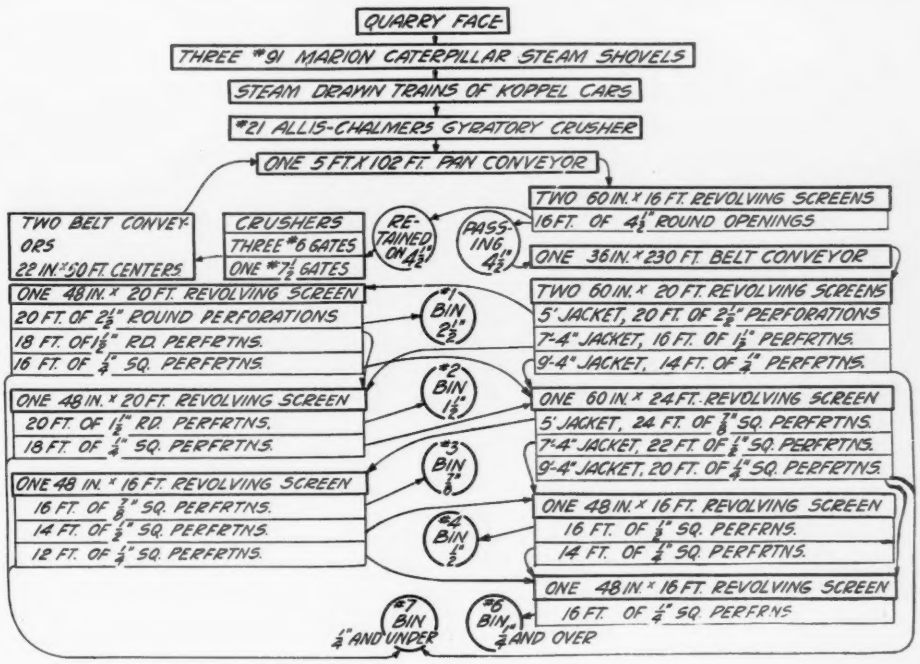


Totally enclosed starting boxes with push button control in the screening and crushing plants

of quarries in Ohio and Indiana, beside the Michigan plant described here. The officers are: President, George A. France; vice-presidents, E. H. France and N. R. France; general manager, Howard E. Bair; superintendent, Joseph Harrigan; purchasing agent, W. O. Bolin. The main office of the company is in the Second National Bank building, Toledo, Ohio.



Flow sheet of the new plant; notice closed circuit crushing and screening scheme grouped about the 42-in. pan conveyor



Flow sheet of the old plant

Estates of Kings Now London Gravel Pits

THE "Kingdom of France" has been turned into a gravel pit. The "Royal Palace" of Portugal has become offices for a local street cleaning department!

Such have been the recent fates of the two great Twickenham estates, one of which was owned by the late Duke of Orleans, banished pretender to the throne of France, and the other by King Manuel, the exiled ruler of Portugal.

A year ago bus conductors through this quiet suburb of London were able to point out the lawns that comprised all that was left of the kingdoms of France and Portugal.

Now they have gone and their memory is rapidly being erased. Following the death of the Duke of Orleans a year ago, Mansion House in Fullwell Park, where the bearded duke had lived among his coats of arms with all the grandeur of a king, has been sold to a land development company. Part of the estate has been converted into cricket fields for the members of a club of retired telegraph and cable officials. Part has been turned to still more humble ends. It is used as a gravel pit for local road repair work.—*Associated Press Dispatch.*

General view of the new France Stone Co. plant at Monroe, Mich.

The Manufacture of Gypsum Plasters

Leaves from an Operating Man's Note Book—Part I

By W. B. Lenhart,
Chemist and Engineer, Long Beach, Calif.

THOSE who have been connected with the gypsum industry know it is not uncommon for the mill to operate for months or more without complaints as to quality. Everything working fine. Spreads good, "pushes" easy, sets right and then when you are just beginning to pat yourself on the back along comes a flock of complaints; fast sets, slow sets, "dead" (Lord, how a plaster "super" hates that word), "won't carry the sand" and everything else that can happen to plaster that is not right.

This continues perhaps for a week or ten days and then as mysteriously as they came the complaints disappear. A careful check of the laboratory notes, plant notes and round table discussion usually amply bring out the fact that no one knows exactly how or why these complaints arose. One experienced and capable chemist will set forth his ideas on the subject and another similar chemist will state his views; and most likely they will be diametrically opposite and still both will have good reasons for their beliefs.

No doubt the complaints were due to someone making a "bull" in his mill or quarry. It will be the author's purpose here to record some of the things that he has found to cause these complaints and to suggest methods of overcoming them, as well as to introduce other information that might be of interest.

There will probably be some operators that will not agree with some of my statements, and it is hoped that they will step forward with their experiences so that the whole subject will be better understood.

General Discussion of Gypsum Rock

The common mineral impurities associated with gypsum are: Anhydrite ($CaSO_4$) or gypsum minus the water of crystallization, calcium carbonate, sodium chloride, elemental sulphur, gypsite and silicious substances. The surface materials which in some cases is badly leached and spongy by nature commonly called "sugar gypsum" can be classed as an impurity along with gypsite when considered with rock gypsum.

Many claim that anhydrite is a good accelerator for stucco and hence not desirable, but this is in some cases doubtful and the anhydrite only acts as a dilutent. The accelerating action of the anhydrite probably is due to raw gypsum associated with the anhydrite, which is difficult to separate.

Calcium carbonate and other carbonates of that group are usually present in gypsum rock, but they are harmless, acting only as dilutents.

Sodium chloride in the raw gypsum in appreciable amounts (0.5%) seriously cuts down the value of the rock for plastering purposes. Not only does it act as an accelerator but after the plaster has set and the residual water starts to evaporate from the wall or tile, as the case may be, the sodium chloride in solution is carried to the surface and is deposited in a crystalline form which is not only unsightly but is continuously sluffing off. This same thing is true of any soluble salt that is in the rock. Small amounts of sodium chloride ($NaCl$) do not seem to affect the strength, whereas there are a host of soluble salts that do, and if any impurities other than those already mentioned are known to be present the gypsum should be looked on with suspicion.

> ### Editor's Note
>
> ***THIS contribution is just exactly what its title says it is—Leaves from an operator's note book. The author is an experienced gypsum engineer and superintendent, and he has jotted down his ideas and suggestions on problems of operation, just as they come to mind. Consequently his contribution is unusual and of much value, as well as interest, to operating men in other lines than gypsm plaster manufacture.—The Editor.***

The accelerating action of salt can be offset by increased amounts of retarder.

Rock has been successfully calcined in which there was a small amount of elemental sulphur and no ill effects were noticed. The presence of the sulphur in the rock probably never would have been known except for the slight odor of sulphur dioxide at the kettles. Stucco dumped from the kettles at this time into the hot pits formed small fumaroles in the stucco, after standing in the pits for a few minutes, and a small ring of sulphur could be readily removed from the throat of the vent formed. It was later found possible for the sulphur dioxide, if present in considerable amounts, to act as an accelerator, but in the above case speeding up of the setting time from this gas was not noticed.

Any silicious material or that usually classed as "insoluble" act as dilutents. Where the gypsum rock is to be used for the manufacture of wallboard or tile the presence of any gritty substance is not desirable, as these hard substances soon dull the saws that are used for trimming the board. Likewise, the wallboard, when used by the mechanics has the same effect on his tools. So the question is not one of having extra saws at the wallboard plant for handling gritty material, but one of satisfying the consumer as well. Gypsite earths as a rule have a high content of gritty material and many deposits are not usable for that reason.

Where burr stones are used for grinding or re-grinding the dulling effect on the cutting edge of the stones makes constant repairs and changings necessary. This continual changing of stone is quite an expense.

For general purposes the amount of carbonate of lime, anhydrite or other dilutents, should be kept as low as possible, but excellent plaster has been made of western rock with a gypsum content as low as 85% ($CaSO_4\ 2H_2O$). To be on the safe side the average was held at 88% by mixing at the quarry some of the higher grade rock with that being mined from the poorer faces.

A word might be said regarding selenite, the crystalline variety of gypsum which in many ways resembles mica in its physical makeup. This material outside of the fact that it acts different in the usual grinding equipment, giving a different shaped particle, can be made into a good grade of plaster. This mineral is not usually present in rock to any great extent and can be neglected.

It is an old saying among plaster operators that "The harder the rock the harder the wall." This statement has been proven many times, but in one case where the rock was a very dense, hard product, in fact dense enough to take a polish, the walls resulting from this rock were unusually hard. This hardness though is gained at the sacrifice of some of the plasticity—beyond question in this case.

The color of rock gypsum runs all the way from pure white to gray, pink and other darker hues without in any way injuring the quality. For hardwall purposes color does not in the least matter, as the plaster is mixed with off-colored sands, etc. For casting purposes the finished product is usually tinted in some way or other. The only gain or advantage that a pure white product has is due to the popular conception that snowy white implies purity. The 88% product mentioned in the preceding paragraph was about

as pure a white product as could be wished for, yet several off-colored deposits have a much higher gypsum content.

To sum up, outside of a few impurities mentioned, if the rock has a gypsum content of 88% or better the possibilities of making a first-class product are good. Where competition is not keen or where no other gypsum is available of course plaster can be produced from leaner material than above mentioned.

Grinding and Pulverizing

A great amount of attention is usually given to the fineness of plaster for hardwall or casting purposes and a screen analysis of seven different brands of gypsum (rock) showed the following variations:

Sample (A)	82% Minus 100-Mesh	67% Minus 200-Mesh
Sample (B)	88% Minus 100-Mesh	67% Minus 200-Mesh
Sample (C)	94% Minus 100-Mesh	77% Minus 200-Mesh
Sample (D)	93% Minus 100-Mesh	78% Minus 200-Mesh
Sample (E)	97% Minus 100-Mesh	82% Minus 200-Mesh
Sample (F)	95% Minus 100-Mesh	80% Minus 200-Mesh
Sample (G)	89% Minus 100-Mesh	68% Minus 200-Mesh

The flowsheets of the mills producing these plasters varied considerably. In some cases the material was ground in Raymond mills without regrinding, in some cases with burr stones both with and without regrinding, and a combination of Raymond mill with burr stones. It is to be noted that with this wide difference in grinding and finenesses that the plasters were satisfactory and successfully competed with each other in western markets.

At one mill equipped with Raymond mills and burr stones both for raw grinding and regrinding the flow sheet could be easily altered to any of the four following conditions:

(*A*) Raymond mill grinding with air separation before calcining.

(*B*) Raw grinding with burr stones followed by regrinding after calcining.

(*C*) Burr raw grinding without regrinding.

(*D*) Discharge from Raymond mills and raw burrs could be delivered to a common point and calcined. This cooked material could be, if desired, reground in burr stones.

Elaborate tests were made with this set up, and it is needless to go into details here; but in all cases, other things being kept constant, if the plaster fineness was kept between 88 and 95% minus 100-mesh and 65 to 82% minus 200-mesh satisfactory plaster to the trade resulted. The plaster could be ground finer than these figures, but with loss in tonnage that was serious

The different types of grinding made in some cases a fluffier or bulkier material, but on the job where the stuff was used this material was no better or no worse than that which was less bulky.

This would indicate that the type of grinding equipment for quality considerations is not important, leaving the question of grinding to be one of pure economics.

Where the material is ground very coarse and then calcined there is the possibility of the larger particles not being thoroughly cooked, or of "cores" being formed. This condition would result in raw or partly cooked gypsum being in the stucco, which should cause fast sets, but it rarely does, as explained later in this article. When this material is reground there is usually enough heat left in the mass to finish calcining (or at least destroy the accelerating properties of the raw gypsum) of these now finely ground cores.

However, this "after calcining effect" is not desirable as the water vapor from this reaction goes into the surrounding stucco and is re-absorbed. This water vapor as well as any occluded steam will go to that stucco which is coldest, and where the stucco is run continually through a storage bin or hot pit, this moisture will tend to be absorbed by that stucco nearest the outer sides and bottom of the bin, resulting in a caked condition if allowed to continue. This caked material on analysis will be found to be not completely calcined, but will carry from 7% to 19% water as water of crystallization. It is needless to point out that this caked material will cause trouble if allowed to get into the finished product.

Some operators have found it to advantage to cool the stucco before passing to the storage bin to prevent this after-calcining effect. By watching all the points in calcining to keep out any raw gypsum or partly cooked gypsum and by regular and systematic emptying of storage bins this condition can be made negligible.

Notes on Calcining

Before proceeding further it might be well to discuss calcining here before proceeding with pulverizing and grinding, for until the chemist has a thorough understanding of the mechanics involved in the calcining of gypsum plasters there will always be a wide difference of opinion, and in deductions from experiments performed on different rocks.

The point I wish to bring out is, just what takes place during the dehydration of gypsum? For instance, to illustrate the question, when calcining a gypsum that has an initial water content of 19.2% (which would correspond to 92% $CaSO_4 \cdot 2H_2O$) there is a gradual loss of the water of crystallization. The loss is more rapid during the first half of the calcining cycle. If samples are taken at time or temperature intervals during this cooking period, does the water content, as an analysis would show, represent the absolute, or does it represent the average, water content of a mixture of particles whose water contents are variable? Or to express it otherwise, are some of the particles over and some under cooked? Another question, are those particles that are extremely fine of a different nature from the coarser? Answers to these questions would not only be interesting, but would no doubt be the road to follow to explain and to remove some of the troubles encountered in the use of gypsum products.

There are some good arguments for the belief that the mixture is one of a variable content at the time of the completion of the cycle of de-hydration, and that subsequent storage coupled with the residual heat causes an adjustment or equilibrium of the different molecules to be established. This, coupled with the usual absorbtion of small amounts of water vapor from the air, accounts for the decided physical change that plaster undergoes when stored for any length of time.

This reversion or change as above outlined is probably the source of more trouble and complaints on "short" working qualities than all others combined; and until a method of retarding this reversion is brought forward, which is theoretically possible, troubles will continue no matter how carefully other phases of the operation are conducted.

Grounds for the belief that there is this readjustment is based on the facts that old plaster with short working qualities usually has 7% water of crystallization and will require 34% water for mixing to get to a working consistency, while the freshly calcined material will require a larger amount of water for working consistency (will usually run over 42% water for rock gypsum plasters), and will have an initial chemically combined water content of approximately 5%. Now if samples are taken from the kettle at a point as indicated by the time-temperature that would yield a 7% product this stucco would show none of the water carrying capacities of an aged product of this water of crystallization content—thus demonstrating that there is some physical change in the make-up of the particles, which probably is a retrograde reaction or turning back to a point of equilibrium.

Secrets of Plasticity

Mention was made in the preceding paragraph of the loss in placticity which is invariably an accompaniment to aged plaster, and this in turn is associated with the facts of lessening the amount of water required for mixing. This would indicate a valuable criterion of the value of gypsum plasters as regards plasticity. This has been found to be the case with this particular commodity in that the greater the amount of water required to bring to working consistency the greater the plasticity.

This is all in line with the old theory that plasticity is a function of the rate of absorbtion by the wall of the water of the mix. The slower the rate of absorbtion the easier to spread. In this case the rate of absorbtion is not changed, but the amount of water available to be absorbed is.

This factor immediately brings up the "clay complex." Someone must increase this

water holding capacity by the addition of clays. Repeated trials of this nature have not increased the plasticity enough to make the expenditure worthwhile. The walls are weakened by the addition of clay, and the man mixing the mortar "spots" the peculiarity at once and a campaign of re-education is necessary. The troubles do not begin to offset the small gain if there is any.

Regrinding After Calcination

Regrinding after calcining is usually accomplished in burr mills, ball or tube mills, and here air separation has been discouraged on account of the likelihood of a re-absorbtion by the stucco of the moisture in the air. Recent literature points out that regrinding under conditions that are "air tight" make a more plastic material, and accounts for this condition as due to the frictional heat liberating water vapor, which if allowed to escape causes a lowering of the plasticity. With all due respect to the experimenters this condition has never yielded a more plastic material in the hands of the author, and the value of the process is dubious.

It has been recently noted that regrinding when carried to extreme fineness caused a marked acceleration of the setting time. To bring about this increase in setting time the idea of 200-mesh or even minus 300-mesh must be forgotten. The material must be ground to that fineness that it would approach the minus 1000-mesh were such possible.

Calcining in rotary kilns has never proven a big success, partly on account of the loss in plasticity and the non-uniformity which no doubt can be traced back to the cores of partly calcined gypsum.

It is well known that raw gypsum when added to cold stucco acts as a violent accelerator, and if the raw gypsum be all minus 200-mesh, an amount equivalent to 5 lb. per ton of stucco will cause a change in the setting time of from 30 minutes to 5 minutes. However, when added to hot gypsum (220 to 270 deg. F.) this small amount of raw gypsum would not be noticed and in fact as high as 150 lb. per ton could be added to the hot plaster, and if kept protected from premature cooling, would show no such acceleration in the setting time. The water carrying and sand carrying capacities would however be seriously lessened. No doubt larger amounts of raw gypsum than that given could be added but for the cooling action of the cold raw gypsum itself.

Where raw gypsum has been added in these amounts it will be found that the plaster at the outer layer of the sack, where the escaping water vapor would come in contact with the colder stucco would have a high water content and possibly be caked.

Many chemicals, including common salt, likewise are good accelerators for cold or warm stucco, but when added to hot stucco as it ordinarily comes from the kettles fall down completely or are not reliable. An accelerator that can be added to hot stucco without changing other considerations is needed by the industry. There are several chemicals that will bring the set down to around 10 minutes, but one that will make reduction of from 30 minutes to 5 minutes is rare.

It is an old and common practice where the kettle bottoms leak, to dump in a few scoops full of pebble gypsum, working on the theory that the coarse material will help plug the leaks. This coarse material, because it is difficult to find in the system afterwards, even when not reground, is assumed to be pulverized by the rabble arms and drags in the kettle, but if the entire content of the kettle is screened these chunks will show up and will be found on analysis to be only partly calcined and hence a source of possible trouble. The practice should be discouraged.

(To be continued)

W. B. Lenhart

The Author

W. B. LENHART, the author of this series of articles, has spent seven years as superintendent and plant manager of two western gypsum companies — the last five years with the Standard Gypsum Co., three as mill superintendent at Ludwig, Nevada, and two years as plant manager at the Long Beach plant. Prior to his gypsum experience he was a research chemist and assistant superintendent in the copper-zinc smelting industry.—The Editor.

Rapid Determination of the Magnesium Oxide Contents of Dolomite

THE usual crystalline fracture of high dolomite limestones makes it easy to distinguish them from high calcium stone with its conchoidal fracture and dull luster. Experience sometimes permits a close guess as to the MgO contents of the rock through its appearance, but the intermediate grades of dolomite (4 to 8% MgO) have an almost identical glisten and fracture and some high calcium limestones present a coarsely crystalline appearance which can easily be mistaken for that of a dolomitic rock.

The accurate chemical determination of MgO in dolomite requires at least 24 hours for full precipitation of the magnesium ammonium phosphate. A shorter method is proposed by S. G. Lasky, mining engineer, Kennecott, Alaska, in a recent issue of *Engineering and Mining Journal.* The time is cut to about 1½ hours. The accuracy of the method is given as to less than 1% on rock running 15% MgO or over and to less than 0.5% on rock running about 5%. For prospecting rock products deposits, the test gives sufficient accuracy with possible exception in determining the value of a particular area for limestone to be used in cement manufacture. In this case the MgO contents of cement are fixed by the standard specifications so a more accurate test method is desirable.

The method of Mr. Lasky's follows:

Dissolve 1 gram of the sample in dilute HCl. Without filtering off any insoluble material, make strongly ammoniacal and add two or three drops of $(NH_4)_2S$ or its equivalent to precipitate any metallic sulphides. Heat to boiling and add enough $(NH_4)_2C_2O_4$ to bring down all the calcium. Filter, evaporate the filtrate, which should contain all the magnesium, to dryness and ignite in the muffle for about 15 minutes. Weigh the residue as MgO, 1 mg. equaling 0.1%. It is unnecessary that the $(NH_4)_2C_2O_4$ be added in solution; the amount of magnesium mechanically entrained with the calcium is negligible in so far as it influences accuracy in this special operation. It does hasten work, however (which is the main reason for developing the method), to make and use a stock solution of such strength that the addition of about 20 c.c. will precipitate the maximum possible quantity of calcium present. All of the magnesium does not ignite to MgO, but there seems to be a constant of error which takes care of this and gives results within the limits mentioned.

A volumetric method was also tried in which the MgO is determined by difference through titrating for CaO and for total alkalinity in terms of CaO. The difference of the two, multiplied by the proper factor, 0.718, equals the MgO. This method is very short; but where the rock contains high percentages of MgO it gives results that are too high.

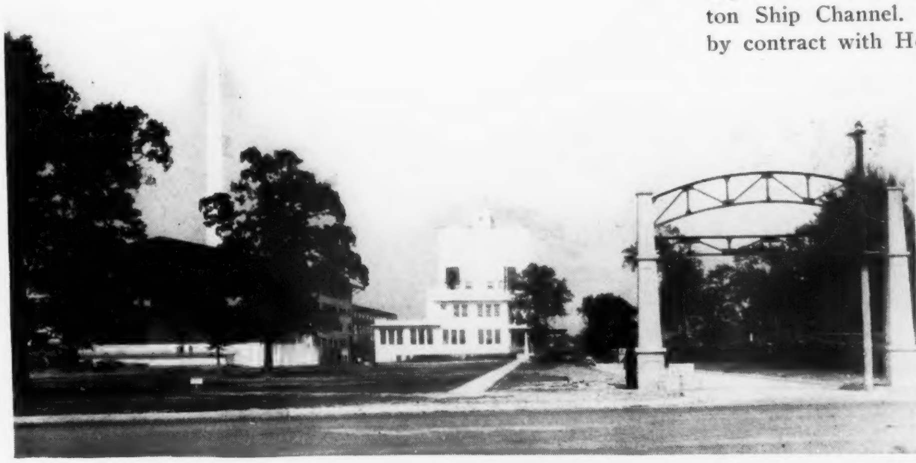
General view showing the relative positions of the different mill buildings, Trinity Portland Cement Co., Houston, Tex.

New Houston Mill of the Trinity Portland Cement Company

Large Units Placed in Skillful Manner Make a Compact, Well Designed Plant Without Neglecting the Architectural Possibilities

CEMENT plants today are being built in the large centers of population, and the buildings of which they are composed are being given architectural and even monumental characteristics, instead of being eyesores. Some of them are surrounded with broad lawns and trees and flower beds, and they are counted among the things worth seeing in the cities where they are placed. Since modern methods of manufacture and efficient dust collecting systems were introduced, they cannot be objected to as neighbors, and sometimes they have added to, rather than detracted from, the value of surrounding property.

No plant illustrates these things better than the new plant of the Trinity Portland Cement Co., at Houston, Texas. It is built less than two miles from the center of Houston, which already has a population of 284,000, and is one of the fast growing cities of the United States. The site is on the Navigation Boulevard, now being made into one of the beautiful drives of the city. The buildings not only make an imposing picture, but the contrast of their clean, white walls with the trees and lawns and flower beds with which they are surrounded, makes the picture an unusually beautiful one.



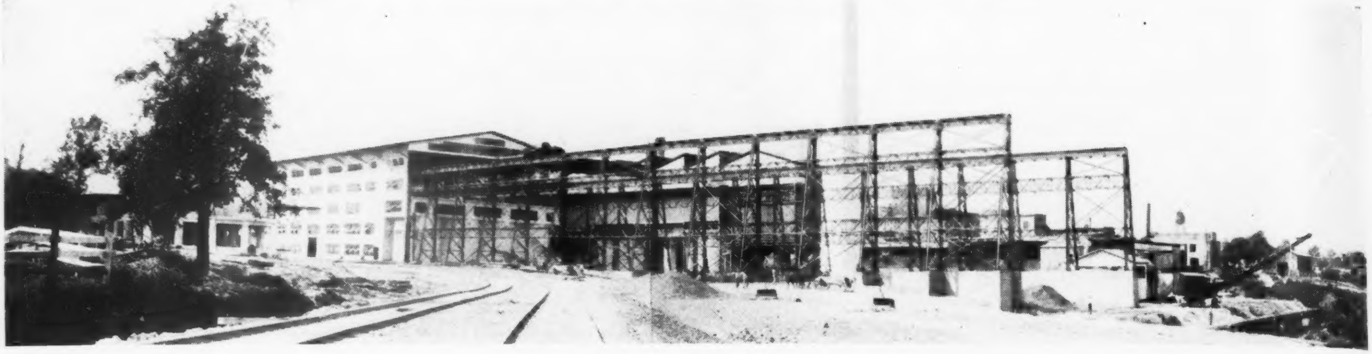
The new mill presents an imposing picture with its white buildings surrounded by lawns and trees

As to the engineering and technical features of the plant, they are fully up to modern standards in the employment of large units and the layout and arrangement of machinery. As is usual with all city plants, where land is valuable, the plant had to be compact. This compactness was attained in a way that is not unusual, by placing the tanks for agitating and storing the slurry under the kiln floor. But in this case the decision to do so took some courage, for the kiln adopted is one of the largest, although not the longest, that has been built. The tall type of slurry tank was chosen, which saved ground space, but it also put the heavy kiln high in the air and called for large columns to support it, which had to be carefully designed. The result of this engineering work has been satisfactory in every way.

Only one 300-ft. kiln has been installed at the start, producing about 1800 bbl. per day, but the buildings are not only designed but actually erected for a four kiln plant to produce 7200 bbl. per day. Without interrupting production, by merely installing additional machinery, the plant can be doubled, and by making the necessary additions to the kiln house and slurry department, it can be brought to four times its present output. When the final capacity is considered, few, if any, plants can show so simple and compact a layout.

Raw Materials

The raw materials used are oyster shells and clay, and both are brought to the plant by water, as the site is on the bayou which is an extension of the Houston Ship Channel. Shells are furnished by contract with Horton and Horton, of Houston. They are dredged from shell reefs in Galveston Bay, loaded into barges and towed a distance of about 50 miles through the Ship Channel. The shells are dredged by a centrifugal pump and washed over screens to remove the sand, the process being that which is used in an ordinary gravel dredge. The con-



The craneway, 655 ft. long and 100 ft. wide, which runs through the entire plant except the kiln and slurry tank house

tract calls for not more than 5% of sand with the shell, but the shell furnished is a great deal better than that, as the silica runs very low. Shells weigh about 1700 lb. to the cubic yard, when well washed, and an average analysis of the shell furnished the Trinity company is:

Lime ($CaCO_3$)	98.2%
Alumina (Al_2O_3)	0.6%
Silica (SiO_2)	1.0%

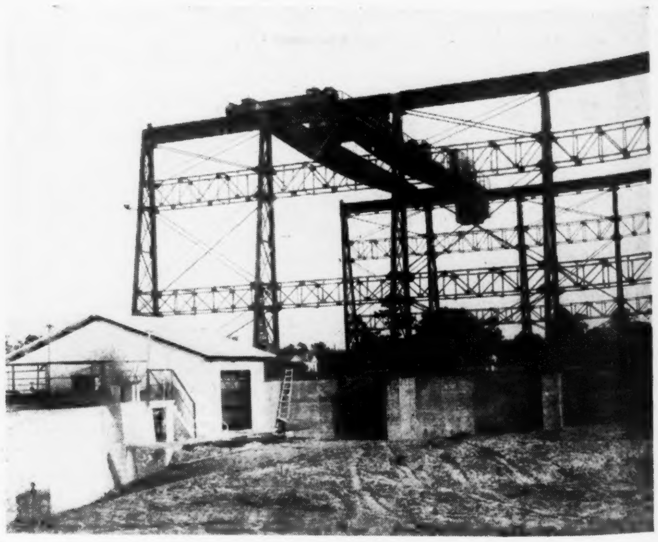
Traces of salt and sometimes a little organic matter accompany the above.

The clay comes from a deposit on the San Jacinto river, located by the company, which is 19 miles down the Ship Channel, and then two miles up the river from the plant. It is dug with a Northwestern crane, gas engine driven, handling a ½-yd. bucket at the end of a 70-ft. boom. The bucket is of the orange peel type, and this was chosen because it could be used to dig vertically. The clay is in layers, some of which contain more sand than others. A dragline bucket would dig these layers separately, so that the clay received at the plant would not be uniform in analysis, but by using the orange peel bucket a fair degree of uniformity can be maintained. The deposit extends below water, and the work is carried on so that the clay removed leaves a channel connecting with the river in which

Tug bringing barges of shell to the plant dock

Unloading shell at the dock

The shell storage, 250 ft. long and 100 ft. wide



Crane distributing shell in the storage

the barge is floated. The barging of the clay is done by contract with the firm that furnishes the shell.

To prepare for receiving the barges of shell and clay, a basin had to be made by digging out the side of the bayou large enough to hold seven barges, which are 100 ft. long and 50 ft. wide, without obstructing in any way the channel through which navigation passes. Each barge holds from 300 to 500 yd., according to the size of the cargo box, and all are of the flush deck type.

The dock at which they are received was built by driving piling and an amount of heavy construction that was a sizable job in itself, since the dock is 560 ft. long. The unloading is by an American Hoist and Derrick Co.'s electric crane, with a 60-ft. boom, on crawler treads. It uses a 1¾-yd. Owens bucket. As a reserve, there is an Orton Crane and Shovel Co.'s crane, with a 1-yd. Owens bucket.

Shell is unloaded by the crane to a pile at the end of the shell storage, from which a traveling crane above the storage takes it and delivers it directly to the mills or distributes it in the storage space. But clay is unloaded directly to the hopper of the clay wash mill.

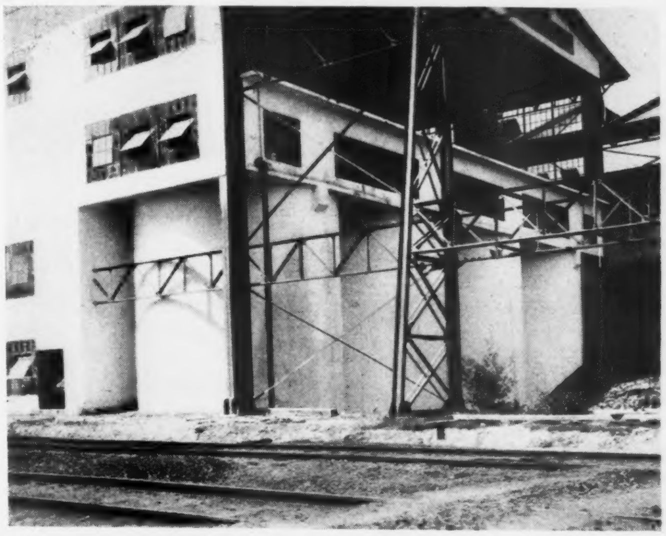
Clay Can Be Corrected Like Slurry

The wash mill, made by the Allis-Chalmers Manufacturing Co., is 26 ft. in diameter and contains the usual arrangement of toothed drags for breaking up lumps and taking out stones and trash. Water is added here to make a "slip" containing 65% of moisture. This figure was reached by experimenting to find the best water content for pumping the clay and agitating it in the wash mill and the clay tanks and more water might be used if desirable, as water is always added at the grinding mill.

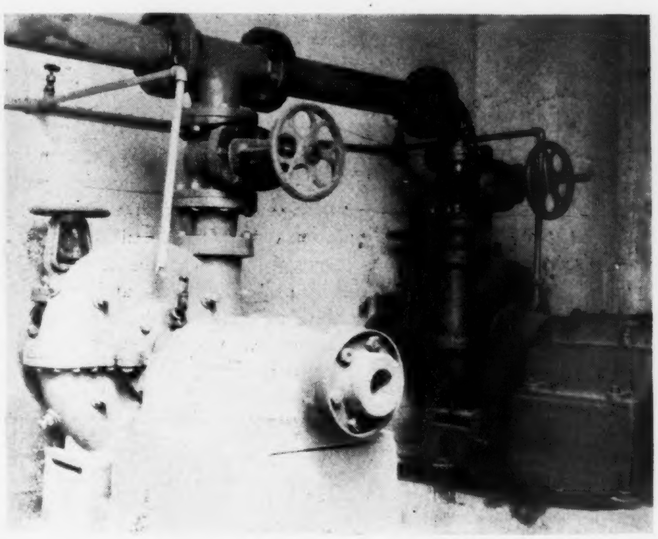
The drive to the wash mill is in a separate building in the basement of which are the clay pumps. The motor is of 75-hp., of General Electric make, and its speed is reduced by an Allis-Chalmers Texrope drive.

In the basement are two 3-in. pumps, made by the Morris Machine Works, one being held as a spare. Each is direct connected to a 30-hp. motor. The clay is pumped an average of 300 ft., and lifted about 75 ft. to any one of the four clay storage tanks. These are silos, 25 ft., inside diameter, and 50 ft. high and fitted with agitating paddles, like slurry tanks. They are connected to two 2-in. Morris centrifugal pumps, by which the contents of the tanks may be agitated and the contents of one tank may be transferred to another, or two tanks may be drawn on at the same time. In this way the clay content of the slurry may be corrected, exactly as the slurry itself may be corrected before it is sent to the kiln. With the lime content of the shell running so uniform, it is rather the clay than the lime component of the mix that needs correcting, one of the differences between the practice of a shell plant and a hard lime-rock plant. The motor which handles the clay feed is controlled from the laboratory. The mill

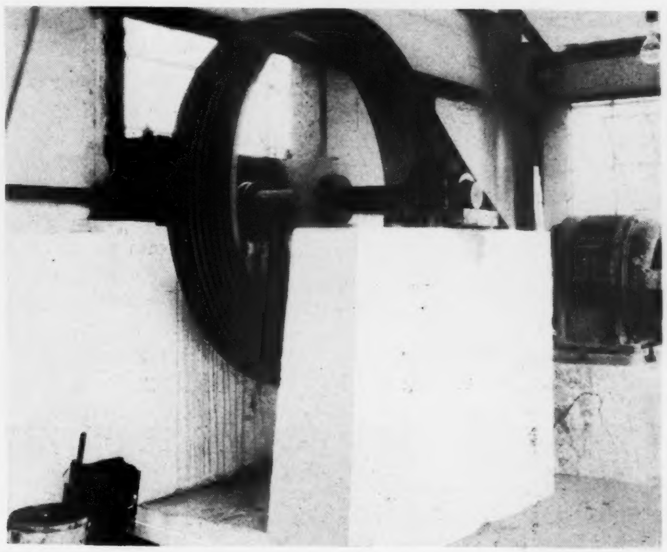
Unloading a barge of clay to the wash mill hopper



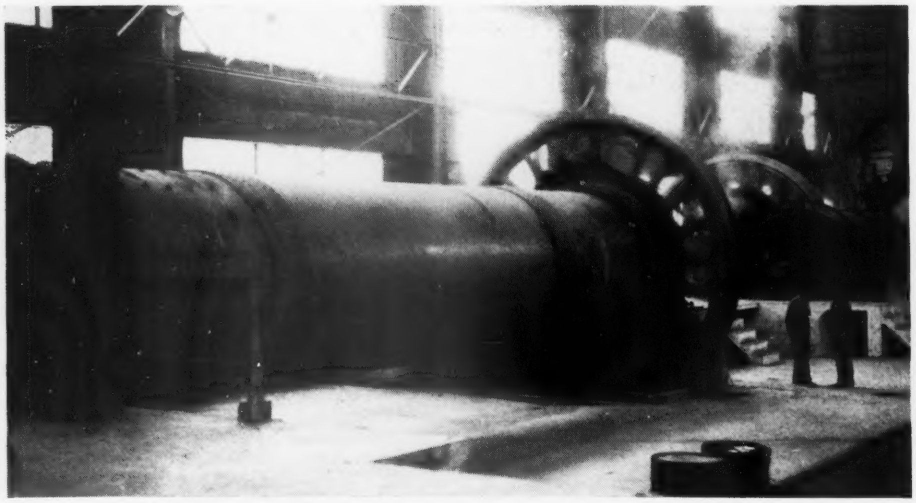
Clay storage tanks equipped with "correction" devices



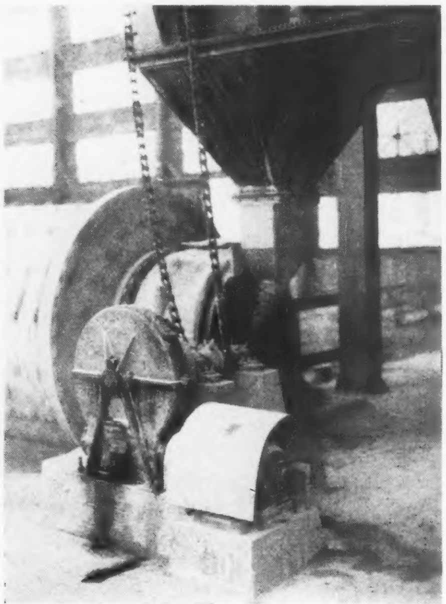
Pumps delivering clay from the wash mill to the storage tanks



Motor and short center rope drive of the wash mill



Raw and finish grinding mills set head to head



Lower part of the raw mill feeder showing the drive

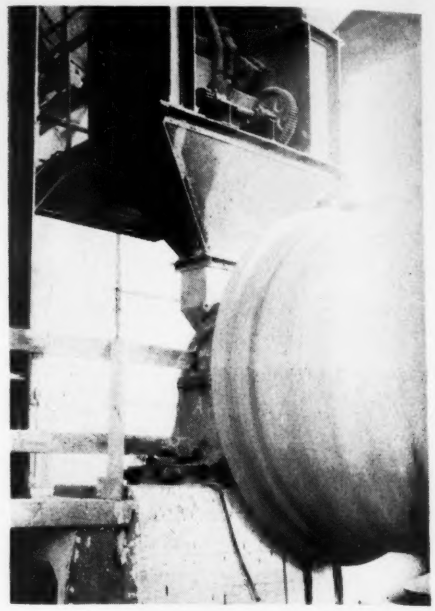
man does not have occasion to touch it.

A craneway, 665 ft. long and 100 ft. wide, runs through the entire plant, except the kiln and slurry tank house. It goes over the shell storage, the clay tanks, the grinding room, the gypsum tanks and the clinker storage, and may take material out of, or put it into, any of these. Under the first 250 ft. of this craneway, beginning at the dock, is the shell storage, which therefore covers 25,000 sq. ft. The sides of the storage are concrete walls, averaging 20 ft. in height, forming the storage pit, and on top of these are 10 steel bents which support the traveling crane track. They were designed and built by the Petroleum Iron Works of Houston.

The crane is of the Harnischfeger Corporation make, and is of 23,000 lb. capacity. It carries a 4½-yd. Hayward bucket. With this it distributes shell in the storage and also loads it to the hopper of the raw grind mill, which holds about 100 yd.

Raw and finish grind mills are in a building 145x100 ft., between the clay storage tanks and the gypsum storage tanks. The sides are mostly of glass in metal sash, so that abundant light is given to every part, as the sides are about 50 ft. high. Only two mills are installed at present, one for raw and one for finish grind, set head to head. There will be eight such mills when the full capacity of the plant is reached.

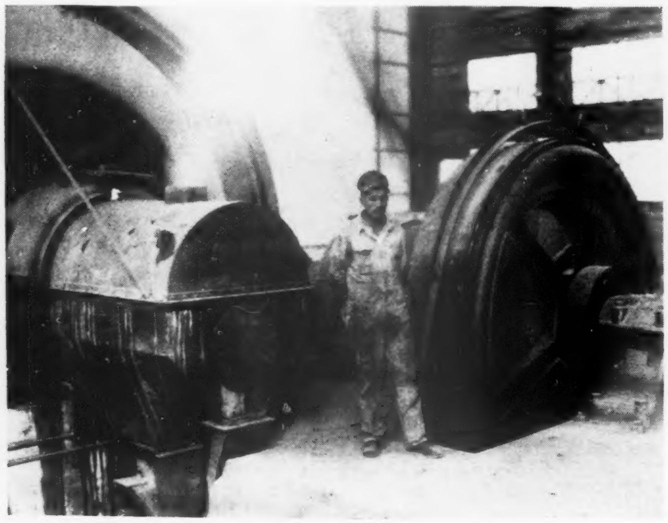
Both mills are the three compartment type, made by the Traylor Engineering and Manufacturing Co. The length is 40 ft. and the diameter 8 ft. Each is driven by a 900-hp. General Electric supersynchronous motor, connected to the mill through a Traylor flexible coupling.



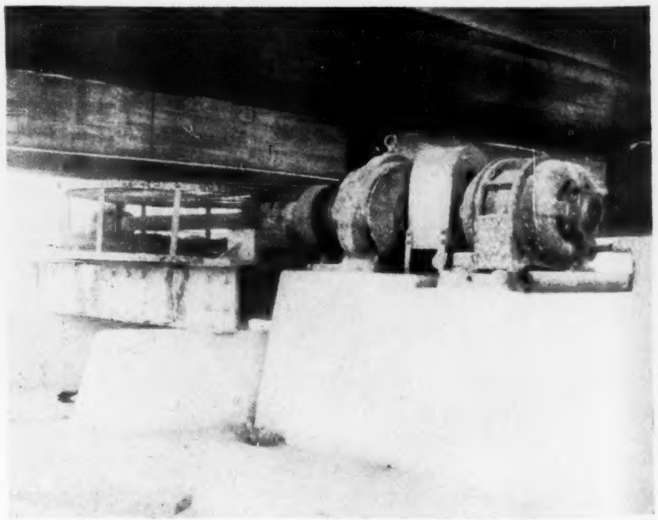
Upper part of the raw mill feeder. The pipes in the center are for water and clay

The raw mill is fed by a Bartholomew feeder, designed by O. V. Bartholomew, general superintendent of the Trinity plants. It is driven, independently of the mill, by a small motor, working through a Foote Bros. speed reducer and a chain and sprocket.

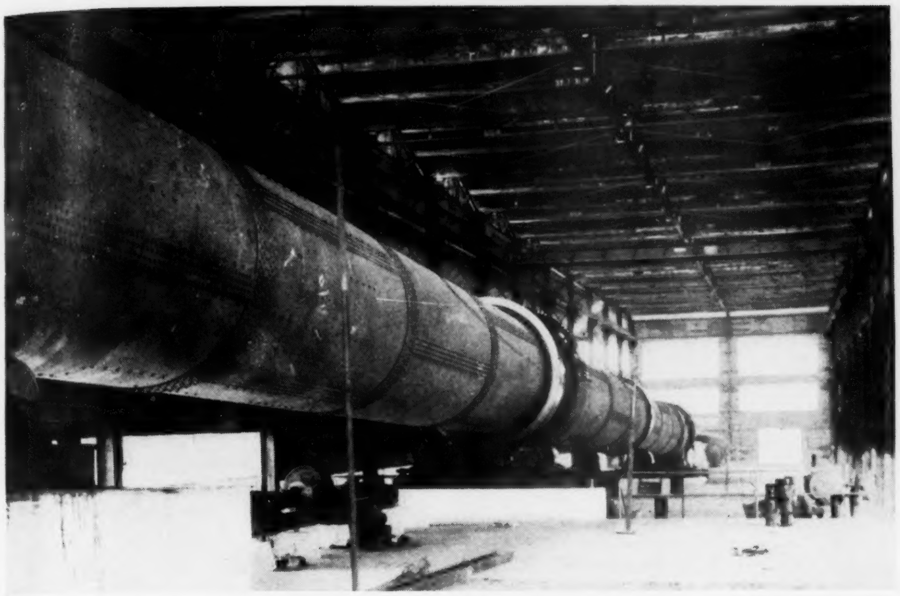
Clay is pumped into the feeder by one of the 2-in. pumps mentioned and water is added at the feeder from a line which takes water from the bayou. The water content of the slurry is high, as compared with



End of finish grind mill and motor



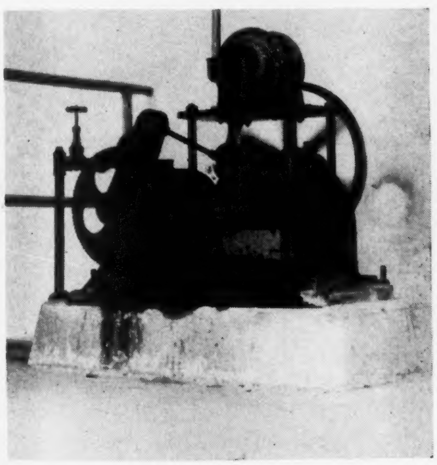
Agitator drive on the kiln house floor



Interior of kiln house showing the 11 ft. 6 in. by 300 ft. kiln. Space has been left for a second kiln

slurries made from hard limestone, as it averages 47%, but this high moisture content seems to be needed with all slurries made from shell in order to get the right consistency for pumping and handling.

The grinding medium is 3½-in. to 2½-in. steel balls in the first compartment and slugs in the second and third compartments.



Bartholomew distributor for agitating tanks with air in turn

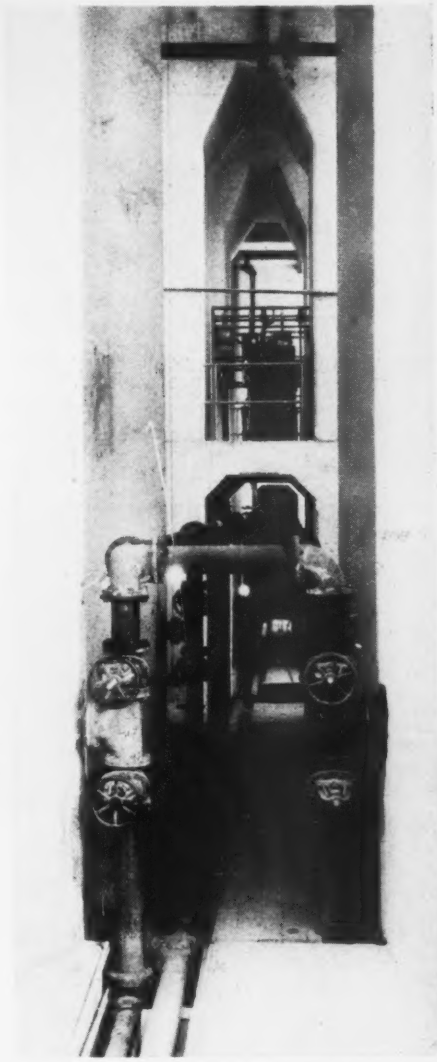
The slurry flows by gravity through a channel below the floor of the grinding room to a pit on the edge of the slurry department, where it is taken by one of the slurry pumps which are all connected to a common suction line.

Agitating, Correcting and Storing the Slurry

For agitating, correcting and storing the slurry, there are 14 tanks of the silo type, all being of 20 ft. and 4 in. inside diameter and 38 ft. high. Twelve of these are for agitating and correcting the slurry and the other two are kiln feed tanks. These tanks are built for two kilns, so that only half the tanks have to be used with the one kiln at present installed.

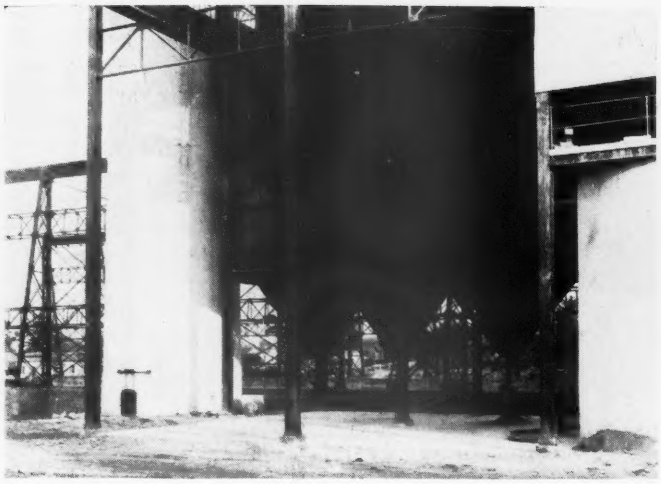
All the tanks are fitted with an agitator designed by Mr. Bartholomew and built locally, consisting of a central shaft on which are radial arms in pairs set 5 ft. apart vertically. Alternately, the pairs of arms extend to the tank wall and half way to the tank wall. On every arm is a plate which is set at an angle against the motion of the arm, so that all the plates form an interrupted screw with a 14-in. pitch. This screw causes an upward movement of the slurry and prevents it from being agitated only in zones, or layers. A little air is added to assist in the agitation, and this is controlled by the Bartholomew air distributor, which gives each tank a "shot" of air in turn, thus reducing the total amount needed for agitation. Air comes from a Sullivan compressor driven by a 100-hp. motor. It furnishes 483 cu. ft. of free air per minute, but only about 50 ft. is used in agitating the six tanks in use, the rest being mainly used by the Fuller-Kinyon pumps of the plant.

The agitating gear is on the cover of the tanks, which, as has been stated, forms the

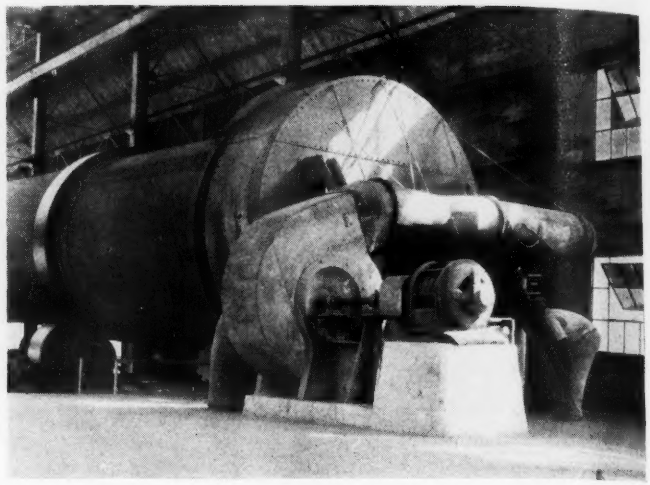


Piping between the slurry tanks, under the kilns

Exterior of the kiln house and stack. Note the saw-tooth construction of the building



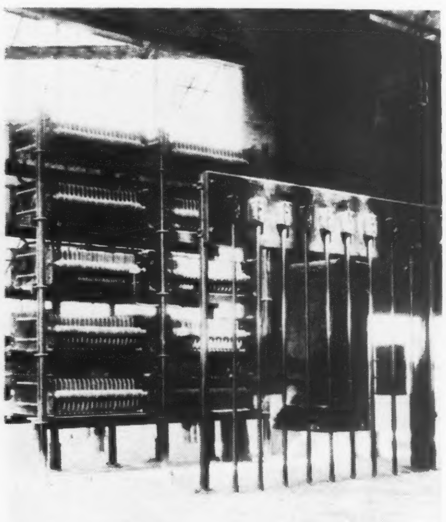
Dust chambers at end of kiln



Firing end of the kiln showing the gas and air ducts

floor of the kiln house. The kiln feed tanks have single agitators, driven by a 7½-hp. motor through a Foote Bros. speed reducer. The other tanks have the agitators in pairs, each pair being driven by a 15-hp. motor through a Foote Bros. speed reducer.

The tanks are built in three groups of four and one group of two, and each group is constructed independently of the others,



Kiln control push buttons and resistances for kiln drive motors

with expansion joints in the concrete footing and in the floor of the kiln house. This provides that there will be no cracking, if any of the tanks settle, but so far no settling has been noted. The concrete slab on which the tanks rest is 3 ft. thick.

For handling the slurry there are two 3-in. Morris centrifugal pumps and two 5-in. centrifugal pumps, made by the Worthington Pump and Machinery Co. These latter are generally used as transfer pumps, while the Morris pumps are used for filling the tanks. The system of piping by which the pumps are connected is simple enough, although rather difficult to describe in detail, but the result is that any pump may be used to do any of the transferring of the slurry to filling the tanks or pumping to the kilns.

Kiln Installation and Supports

As was noted in the introductory paragraphs, the kiln house and the supports of the kiln form one of the interesting features of the plant. To accommodate the slurry tanks below, the highest point of the kiln was raised to 47 ft. above the ground level. The kiln itself is 300 ft. long and 11 ft. 3 in. in diameter. (It may be noted that the Trinity company was among the pioneers in the use of large kilns, and at the time that its 250 by 11 ft. 3 in. kiln was installed in its Fort Worth plant there were only a few kilns that equaled or approached it in size.)

The kiln in the Houston plant was made by Traylor. There are four points at which it is supported on tires, spaced 36 ft., 88 ft., 88 ft., and 66 ft., beginning at the feed end. Under each of these points is a massive block of concrete. The largest, under the center support, is about 40 ft. long and more than 15 ft. thick in the thickest part. The others are about 20 ft. long and from 8 ft. to 10 ft. thick.

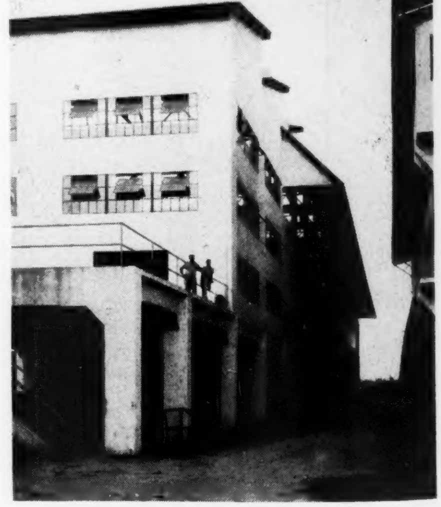
Each of these blocks is set on a group of four concrete columns, 36 ft. high. The largest columns are under the center of the kiln and these are 9 ft. square, the others are 5 ft. square. The whole load to be supported is approximately 9,000,000 lb., a part of which is the live load of the kiln, the shell alone weighing 588,000 lb. All the columns rest on bases of concrete 3 ft. thick, and each base is separated from the bases under the tanks by expansion joints. The columns are reinforced by 1-in. rods (48 of them) and hooped with ¼-in. rods every 6 in.

Before deciding to build in this way, the ground was tested and found able to stand a load of 1½ tons per sq. ft., although a part of it was rather slippery clay. The only trouble in placing foundations came when the excavating uncovered a large city sewer, and the base of one group of columns had to be redesigned to avoid disturbing this. Locally bought sand and gravel were used as aggregates and the concrete mix was designed to give a compressive strength of 2500 lb.

The superstructure, enclosing the kiln, has a structural steel frame with thin concrete curtain walls, and is 32 ft. high in the clear. The roof is of the saw tooth type, to give ample light, and this is something of a novelty in cement mill construction, although common enough in other industrial buildings.

The kiln has lifters, to raise the slurry and let it fall through the heat, made of plate, 6 ft. long and 18 in. wide, and set at a 30 deg. angle in the direction of the kiln rotation, and placed in the colder end of the kiln.

The drive of the kiln is a 150-hp. motor working through a Texrope reduction and a train of steel gears. It has been found



End of kiln house and platform over the cooler

that only 75 hp. is actually needed to turn the kiln under normal conditions.

There are three dust collecting chambers placed between the kiln and the stack, all 32 ft. high. The first is 18 ft. by 25 ft. in section and the others are 12½ ft. by 25 ft. Each chamber has a

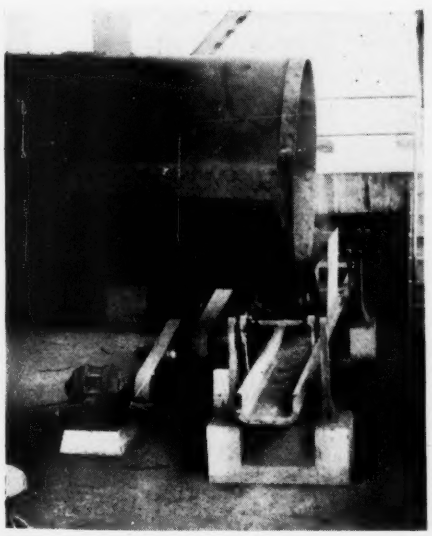
central baffle plate, so that the gases have to pass up three times and down three times before entering the stack. The stack is 300 ft. high and was built by the Heine Chimney Co.

Burning With Natural Gas

Natural gas is used as fuel, as is coming to be the common practice in the Texas plants. About 2000 cu. ft. are burned per barrel, and this is the usual amount required by other plants. The gas is received from the gas company's line at 30-lb. pressure and passed through a regulator, in which the pressure is reduced to 10 lb. By means of a valve in the gas line feeding each kiln burner, the pressure is brought to 1 in. of mercury, or less, as it enters the burner.

The burners used were made by the Tate-Jones Co., of Pittsburgh, and are of the usual type used in cement burning. All the air that goes into the kiln, except that which may find its way in through unsealed openings, is fed in with the gas and is preheated by being drawn through the cooler.

The fan used was made by the American Blower Co., and it is 5 ft. 6 in. in diameter and run by a 40-hp. motor, direct-connected. It passes the air from the cooler through a 32-in. pipe, which is connected with two 20-in. pipes, one for each of the two burners used. Dampers in these pipes regulate the air used.

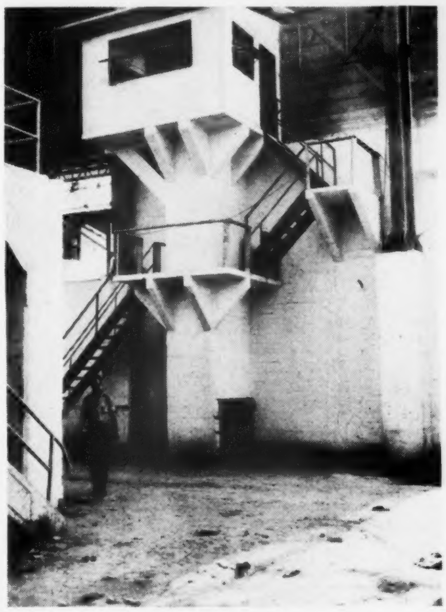


End of cooler and shaking conveyor to clinker storage

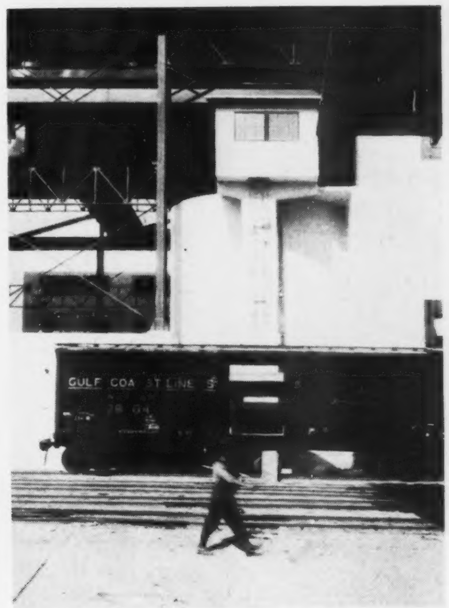
The feed of slurry to the kiln is from a feeder of the company's own design, and built by it, of the Ferris wheel type, and the motor which drives this may be regulated from the laboratory, so that the feed may be controlled by the chemist. A tachometer in the laboratory tells him how this motor is running and hence the amount that is being fed. The motor drives the feeder through a Foote Bros. speed reducer.

Aside from this, all the operations are controlled by a row of push-buttons set on a pipe frame at the firing end of the kilns. There are ten of these, but five are for the kiln that is to be installed in the future. In order, they control: 1, start and stop of feed; 2, adjustment of feed; 3, the fan motor; 4, motor of "skipulter" conveyor that takes the clinker from the cooler; 5, motor of elevator that lifts clinker to storage. The start and stop, and the speed of the kiln are controlled by a rheostat set near this frame.

The stack was designed for a 1¼-in. draft, but only a ½-in. draft is used. Space is left for a draft fan, if it should be needed at some time in the future.

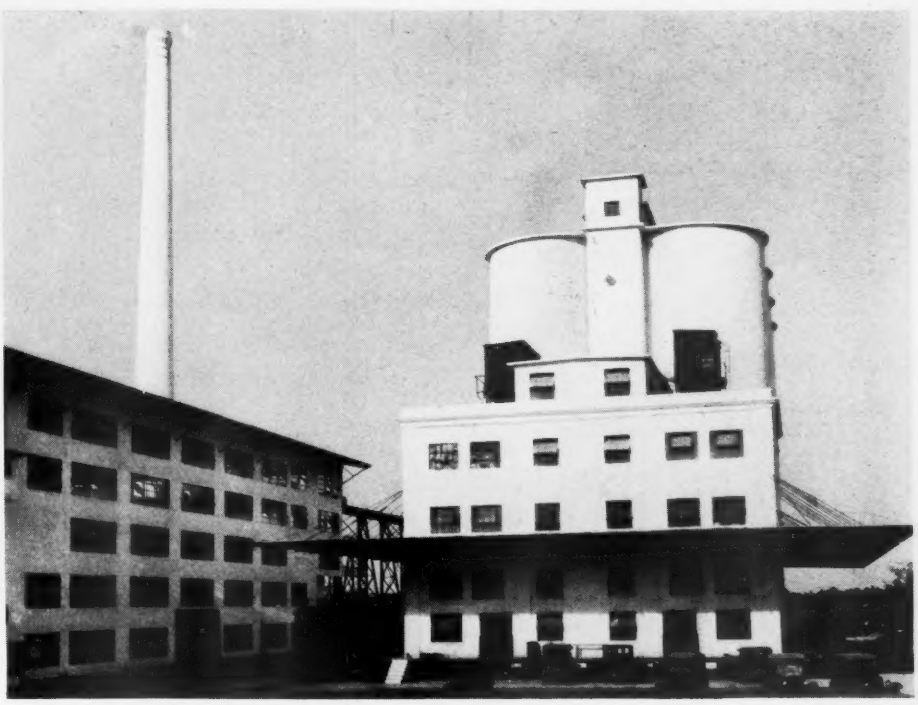


Elevator for lifting clinker over the storage wall

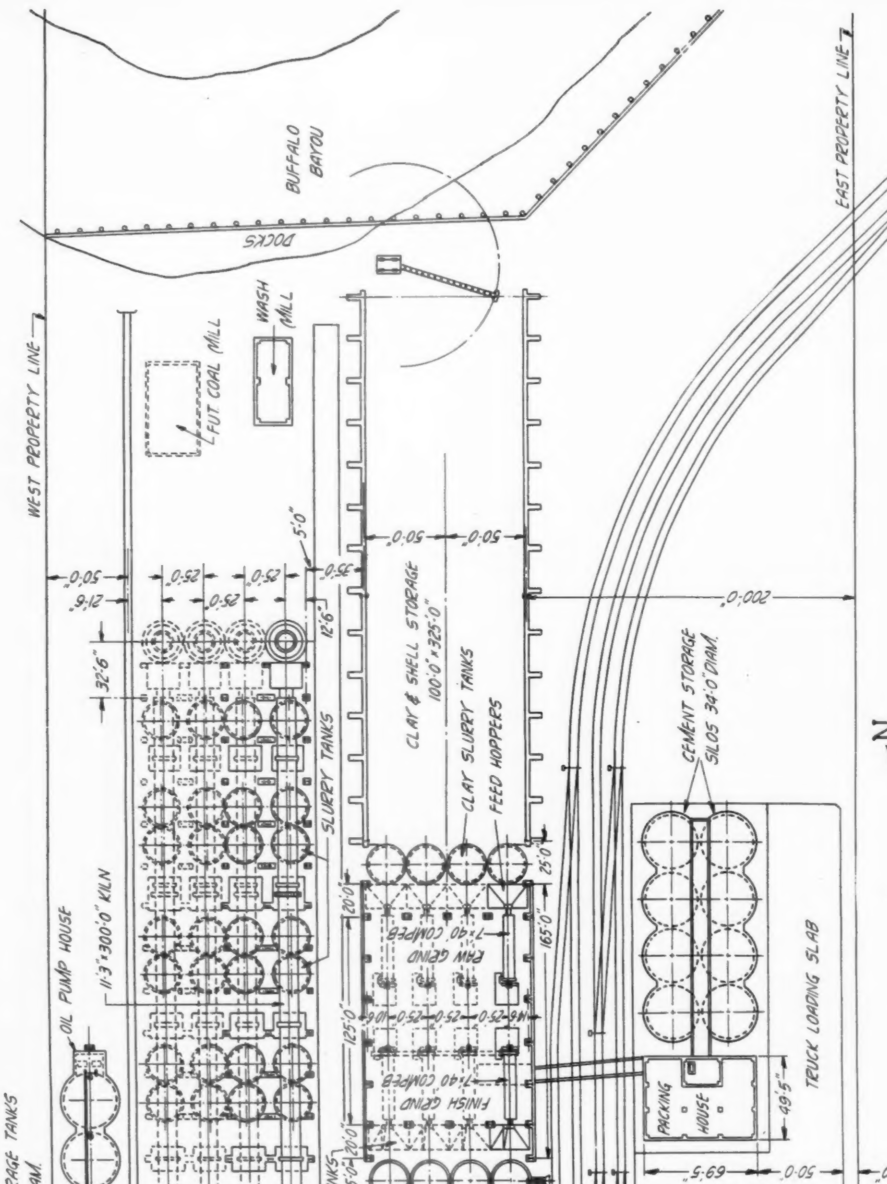


Elevator unloading gypsum

The burned clinker falls into a concrete chamber, 7 ft. wide and 22 ft. high, which extends across the front of the kiln. From this it flows to a second chamber and then into the cooler, which is of Traylor make, 80 ft. long and 8 ft. in diameter, and driven by a 50-hp. motor through a Texrope drive. The combination of this cooler with the chambers mentioned is efficient, the clinker being discharged far below the point of redness. It is further cooled by an F. L. Smidth & Co. "skipulter" conveyor which takes it from the cooler and carries it through a tunnel under the road to a 16-in. elevator, about 40-ft. centers, which lifts it over the wall of the clinker storage. This conveyor is driven



Pack house and storage silos



General plan of the Houston, Texas, plant of the Trinity Portland Cement Co.

by a 10-hp. motor through a Foote Bros. reducer.

Because all the space beneath the kilns is filled with slurry tanks, the cooler is set in the same direction as the kiln, instead of being reversed in the more usual way. Above the cooler is a platform, which makes a roof for the cooler and is also a handy place from which to handle a long bar, if it should be necessary to punch out a ring.

The clinker storage is 125 ft. long and 100 ft. wide. Clinker is distributed in this by the plant crane, which also feeds clinker to the finish grind mill.

Finish-Grinding, Storing and Packing the Cement

Gypsum for grinding with the clinker is received in box cars, which are unloaded through a chute to the boot of a 16-in. elevator, about 50 ft. high. This lifts it to the first of the four gypsum silos, which are of the same dimensions as the clay storage tanks at the other end of the grinding department. The crane takes gypsum from this first silo and puts it in the others as needed.

The finish grind mill is just like the raw grind mill described, and, like it, driven by a 900-hp. supersynchronous motor. The Bartholomew feeder is used, the small compartment (which is not used in the raw grind mill feeder) being used for gypsum. Grinding is carried to 91% through 200 mesh, and the capacity of the mill is such that this is easily done with a reduced load of balls.

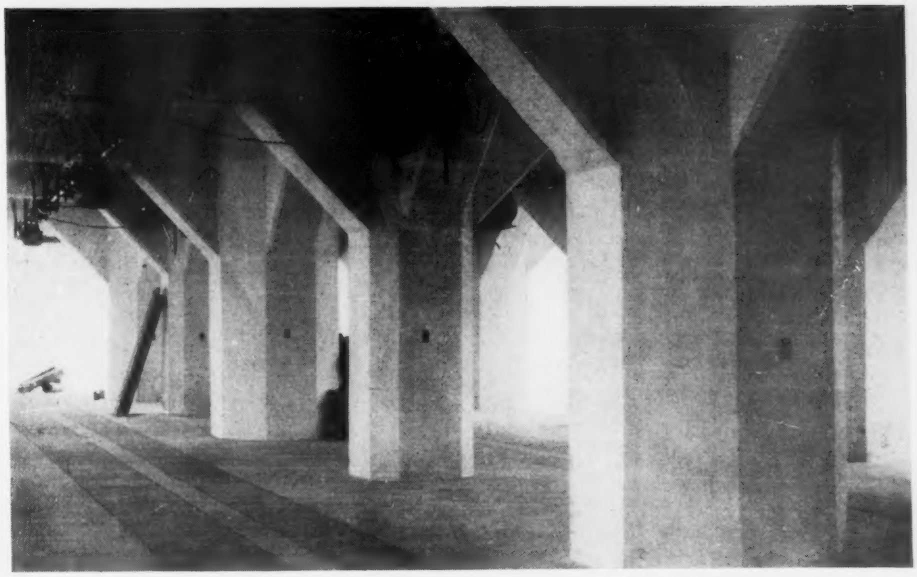
From the mill, the cement falls to a pit connected to two Fuller-Kinyon 4-in. pumps, each connected to a 30-hp. motor. Only one of these pumps is used at a time, the change being made about once in 12 hr. The pump sends the cement through a 4-in. pipe line to the silos at the pack house, a rise of 110 ft. and a run of 220 ft.

The silos are 80 ft. high and 32 ft. 8 in. inside diameter, and with the intersticial bins between them they hold 149-000 bbl. They are set on concrete columns, so that portable packers can be used below them, taking cement directly from a silo, the same arrangement which was used in the company's Fort Worth plant. When stationary packers are used, the cement flows down through a portable spout to screw conveyors set under the floor. Four of these are lateral screws, each 115 ft. long, with 12-in. flights, and these feed into one longitudinal screw 50 ft. long, with 16-in. flights which takes it to a 20-in. elevator.

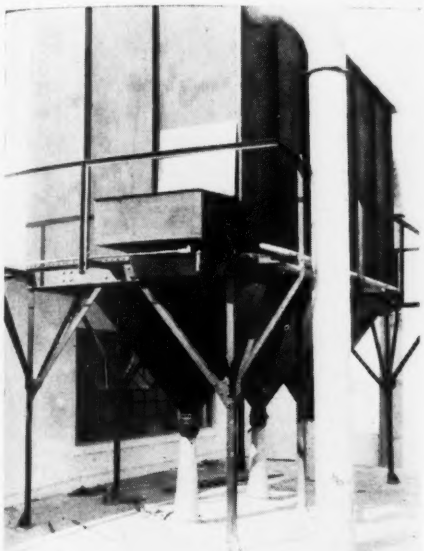
An interesting point in the installation of these screws is that an air channel goes along beside each of them, and this is connected with the Sly dust collecting

system, so that no dust from the screws can get into the building.

There are two stationary packers and two portable packers, all of the Bates 3-valve type. The sacks from the stationary packers fall on a portable conveyor, designed and built by the company. It is of the chain and bar type, instead of the usual belt, and it is mounted on trailer axles with rubber tired wheels, so that it can be rolled to the truck loading side of the pack house or to the car loading



Silos supported on columns to permit use of portable packers

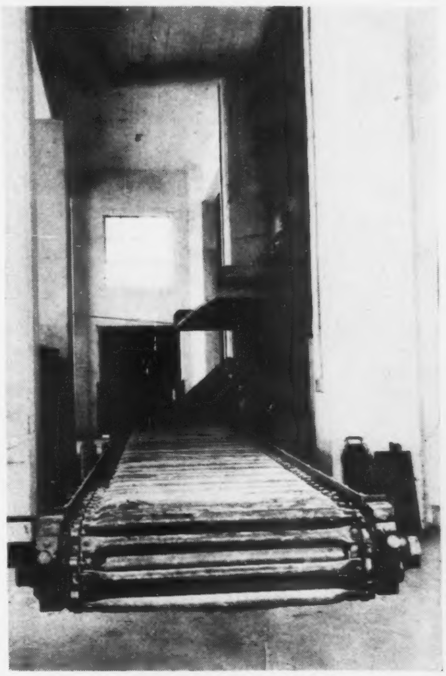


Dust collectors on pack house roof

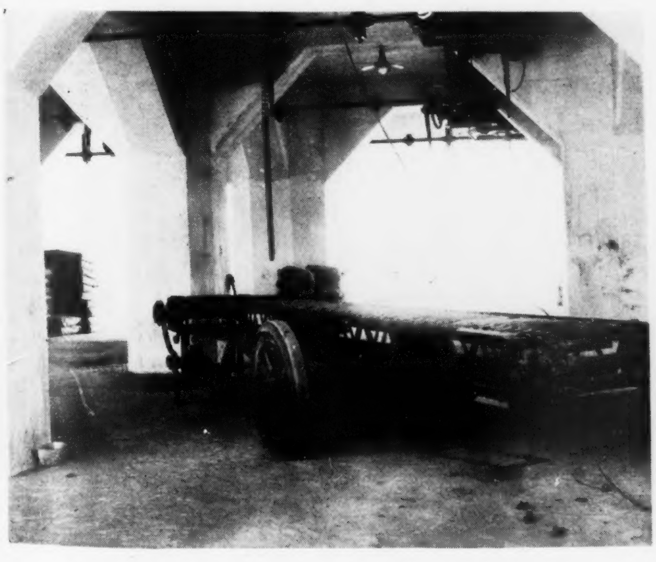
side. It is carried on a lattice frame of light steel and the drive is a 5-hp. motor through a Foote Bros. spur gear reducer. A smaller conveyor of the same type is used with the portable packers.

There is a truck loading platform 7 ft. wide on two sides of the pack house which is supported on cantilevers of concrete, making it easy for trucks to drive so close that the ends of the truck axles are under the platform. It is expected that a considerable portion of the cement that is used locally will be delivered by truck to the job from the pack house, although sold through dealers, and an office has been partitioned off on the lower floor for the clerical work of such deliveries.

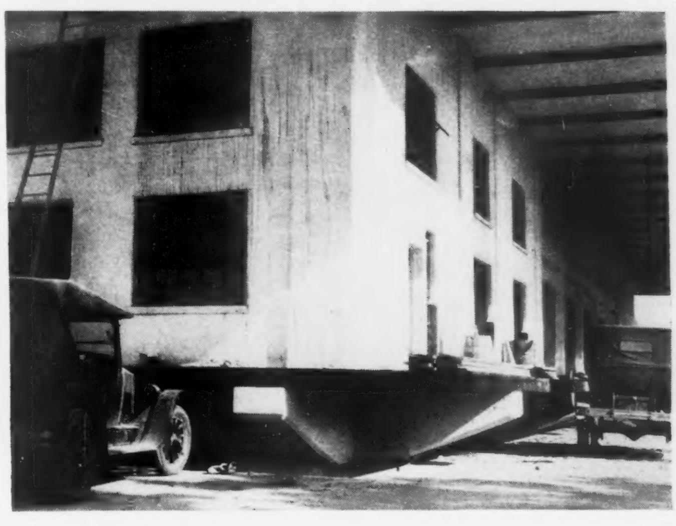
The pack house itself is an unusually beautiful building of four floors, set against the silos. The lower floor contains the stationary and portable packers and the office referred to, the second has the tables and machines for repairing and tieing sacks, for which four Bates tiers are employed. The sacks, after cleaning, come to this floor from a hopper and chute under the sack cleaner. On the floor above is the sack cleaner, the usual rotary wheel in a concrete box, designed and built by the company and belt driven by a 10-hp. motor. On this floor, and the floor below, sacks are stored. On this floor, too, is the screen screw through which all the cement that goes to the stationary pack-



Portable sack conveyors



Portable sack conveyor used with portable packers



Cantilever supports under truck loading platform

ers is passed. It consists of a revolving screen 18 in. in diameter and 24 ft. long, which is around an 18-in. screw of the same length. The screw and the screen revolve together. The dust from the Sly dust collectors above is piped to this screen. The drive of the screen is a 15-hp. motor through a spur gear reducer of the company's design. Similar reducers of the company's design are used on the screws which recover the cement from the silos.

The cement is elevated to this screen, from which it falls to the hoppers of the packers, by a 20-in. elevator of 60 ft. centers, receiving its load from the screws under the silos; as mentioned above.

On the fourth floor, which is in a sort of penthouse, are the fans for the dust collectors and the machinery for the platform elevators. There are two in the building, a freight elevator, and a man lift, both made by the American Elevator Co.

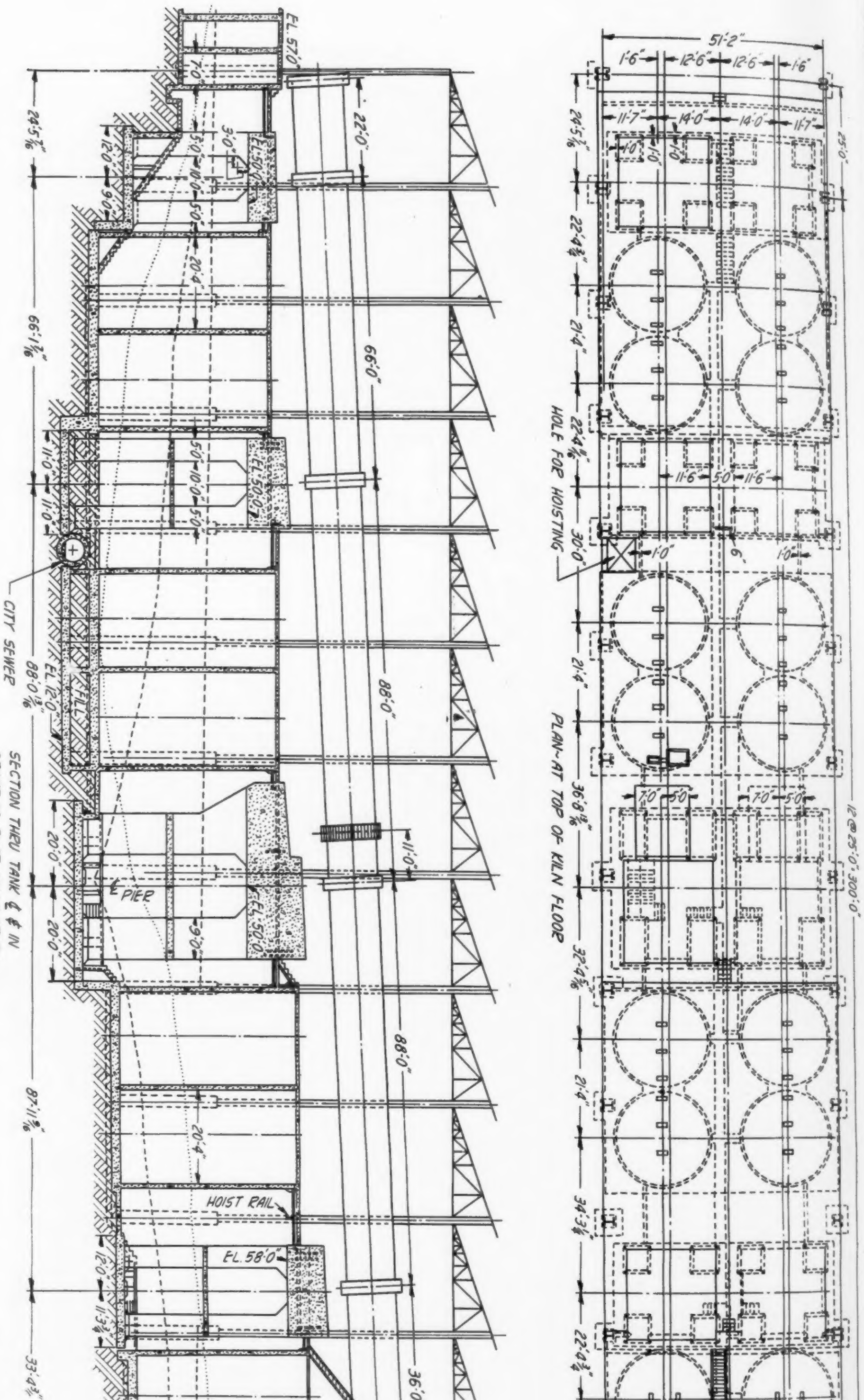
The two Sly dust collectors are independent units, each having its own fan, made by the American Blower Co., direct connected to a 15-hp. motor. Both fan suctions are connected to the packers, the channels in the floor mentioned and to the sack cleaner.

Electrical Details

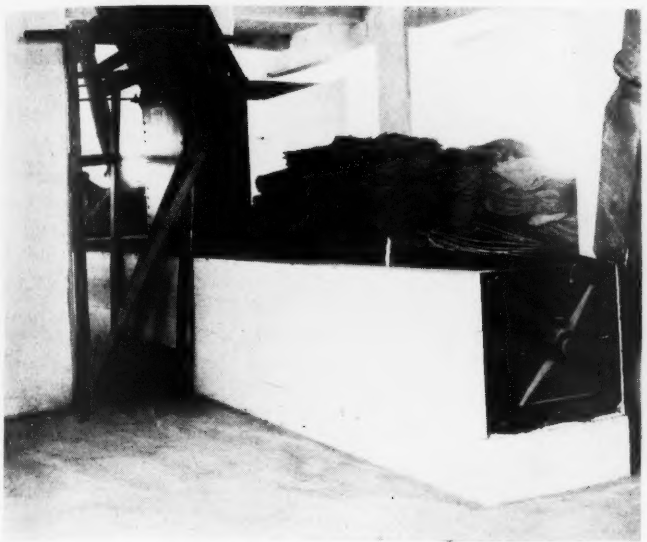
All the electrical equipment was supplied by the General Electric Co., and the electrification details were worked out in consultation with I. T. Hockaday, the representative of the General Electric Co. in Houston. The motors range in size from ½-hp. to the 900-hp. supersynchronous motors that drive the grinding mills. All motors of more than 20 hp. are operated on 2300-v. current. With the exception of the motors in the machine shop, all the motors are controlled by "across-the-line" starters. The two supersynchronous motors have controls of this type, with the push button located near the motor and the control apparatus in the basement of the kiln house.

The induction motors, ranging from 150-hp. down, are controlled by push buttons and magnetic switches, which are also in the kiln house basement, between two groups of tanks. Push buttons are placed near the motors and the switches are grouped and supported on a neat frame of pipe work. This arrangement was designed by W. O. Stuart, the company's chief electrician.

Short circuit protection was worked out in this way: The motor bus is fed from the switchboard to the bus on the pipe frame, and from this bus several motors are fed. There are no oil circuit breakers between the bus and the switch, and if a short circuit occurred on the motor side of the switch, it would be necessary for this switch to interrupt the short circuit. It was found that the switch did not have the necessary capacity and two relays



General plan and elevation of the kiln house, Trinity Portland Cement Co., Houston, Texas



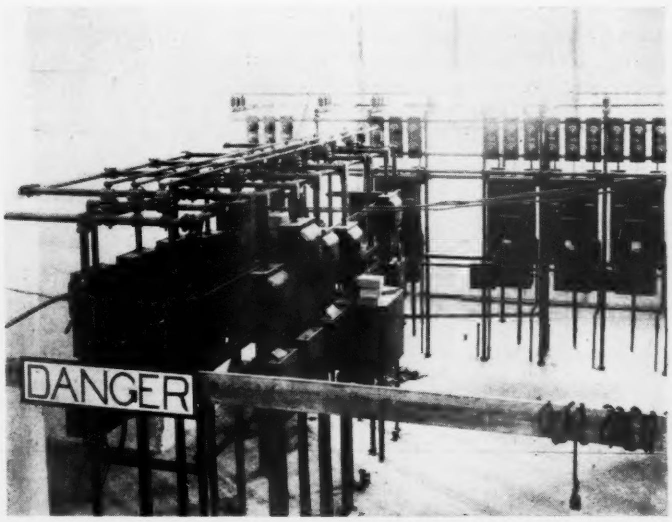
Screen-screw through which cement passes before going to stationary packers

Tying sacks. The chute at the right comes from the sack cleaner

were installed for short circuit protection. The contact points on these relays are all connected in series with the low voltage device of the oil circuit breaker of the main switch board. Thus, in the case of a short circuit, the relay will open the oil circuit breaker of this particular feeder. All the relays used on the 2300-v. motors have a hand reset; thus it is possible for the electrician to determine on which motor circuit a short circuit occurs.

The auxiliary departments of the plant

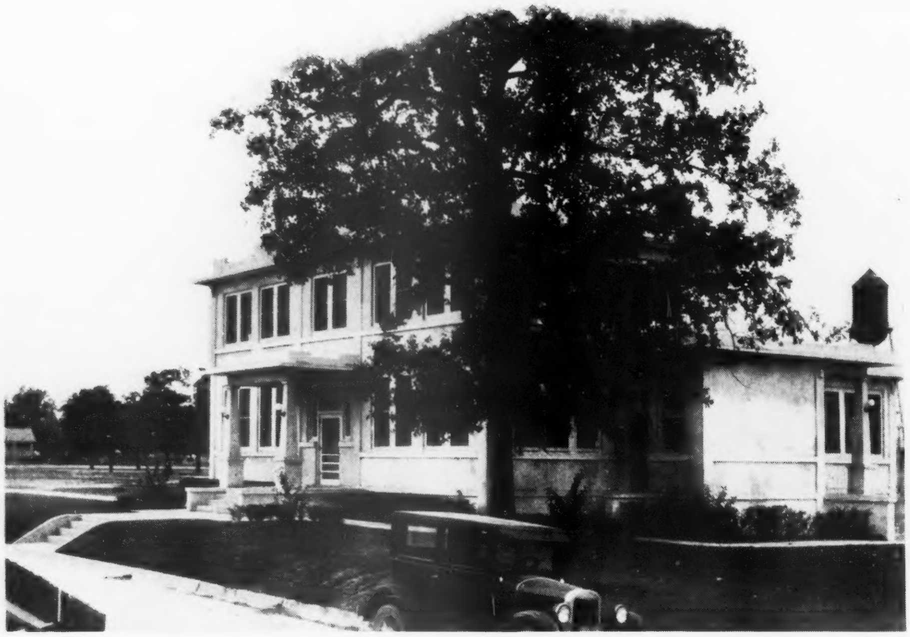
A section of the machine shop



Magnetic switches and relays in kiln house basement

A corner of the chemical laboratory

Interior of the physical laboratory

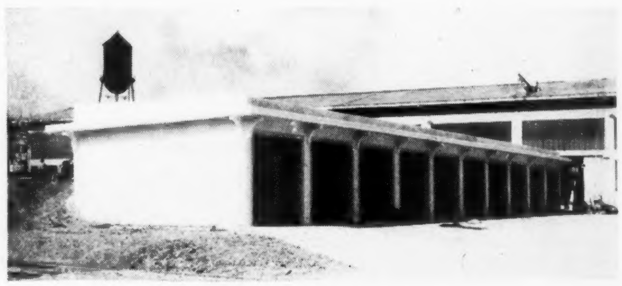


The beautiful office building and its surroundings gives some indication of the ultimate appearance of the entire plant when landscaping will be completed

are housed in a building about 250 ft. long, which contains the machine shop, the stock house, the plant switch board and the electrical repair shop. This building is of light steel frame covered with gunite concrete siding. Between it and the plant is a concrete garage for the cars belonging to those employed in the plant. Parking space for other cars is supplied near the office building.

A change house with wash rooms for the men is to be constructed shortly which will be like the building for the same uses in the Fort Worth plant.

The office and laboratory building stands a short distance south of the plant, and it is one of the neatest structures of the plant. It is 65 ft. by 50 ft. on the ground floor, which contains the main office, superintendent's office, the drafting room and engineer's office, and the chemist's office and the chemical laboratory. The last named is in a room about 25 ft. square on the first floor. The physical laboratory and the room for the preparation of samples are in the basement and they have ample light because the office is built on a hillside, and the wall on that side is all above the ground.



Concrete garages for employes' cars

The railroad trackage presents a somewhat unique appearance, as shell has been used for ballast. There are four tracks between the grinding mill and the pack house. That nearest the mill is the gypsum unloading track and the others are used for loading cars of cement and unloading cars of supplies. All plant tracks are connected with cross over switches and connect with a switch track that goes to the I. and G. N. railroad. Ample space is provided at both ends of the track system for the storage of loaded and empty cars.

Layout of Plant and Construction of Buildings

The direction of the buildings is approximately north and south, and all are parallel. The main structure, which includes the shell storage, the clay storage, the grinding department, the gypsum storage and the clinker storage, begins at the dock and runs back for a distance of 665 ft. This is in the center of the plant site, the kiln building, about 375 ft. long, being to the west and the pack house and silos, about 225 ft. long together, being to the east. Oil storage tanks space is provided beyond the kiln house, in case oil should ever be used for fuel, and a space for a coal mill has been left, if coal should be the preferable future fuel. Concrete roads are to connect all the buildings, and these are partly constructed at the present time.

Slip form construction was used even more than is common in the construction of this plant, as so many silos and tanks of the silo form were included in the design. All this work was done by the Southwestern Engineering Co. of Springfield, Mo.

The layout of the plant, dimensions of the buildings, choice of the machinery and the other main points were by O. V. Bartholomew, the general superintendent, but his son, R. O. Bartholomew, worked out the engineering and architectural details. He is the chief engineer of the plant, and a young man, not so long graduated from Texas Agricultural and Mechanical College. Before starting the work of designing this plant, he and his father made a tour of some months visiting some of the best known plants in the country, making notes of each and studying them.

R. O. Bartholomew, chief engineer

A. E. Flowers, chief chemist

Unusual care was taken with the ap-

pearance of the buildings, in making the drawings for them and in some cases perspective water-color drawings were made to get the effect of the finished structure.

The plant had been running but three weeks when it was visited to obtain the notes for this article, and construction of minor details was still going on. Naturally the appearance of the grounds was not what it will be when all the landscape gardening plans have been carried out, but something of what it will be can be seen from the appearance of the surroundings of the office building, where lawns have been seeded and flower beds filled with plants in bloom.

The plant is set back a considerable distance from Navigation boulevard, and the approach is by a wide concrete road. The entrance to this road is through a gate of concrete posts carrying an arch of light steel, made to hold an electrical sign, which will show the name, Trinity, with the brand of the company, in colored lights, on either side.

The Product—Plant Personnel

The cement that has been made is notable for its very high lime content and A. E. Flowers, the chief chemist, says that he has been unable to find an analysis of an American cement which is so high in lime, although there are such cements made in Europe. In spite of this high lime, there has been no trouble with unsoundness. Not a sample has yet shown a "bad boil."

Naturally such a cement has satisfactory early high strength qualities.

Beside O. V. Bartholomew, general superintendent, and his son, R. O. Bartholomew, chief engineer, the plant personnel includes A. E. Flowers, chief chemist; J. C. Cole, assistant chemist; W. D. Stuart, electrical engineer, and L. P. Chaney, electrician.

The main office of the company is at Dallas, Texas, where the company has its largest plant. The officers are: President, W. H. L. McCourtie; vice-president and general manager, C. E. Ulrickson; secretary, Frank G. Ray; treasurer, M. J. Scanlon; purchasing agent, J. J. Horgan; general superintendent of all plants, O. V. Bartholomew.

Expansion of Neat Portland Cement in Steam

AN investigation was made by the U. S. Bureau of Standards of the volume changes produced in various portland cements when neat cement specimens were subjected to steaming and boiling tests. Data were secured on 32 different cements when tested by the following four methods: (a) The regular specification test, 5 hours steaming of cement pats; (b) the Le Chatelier tongs test, involving 6 hours boiling; (c) bars, 1x1x6-in., steamed 5 hours, and measured by a special micrometer, bearing against glass inserts in ends of bars; (d) identical bars and treatment as in preceding test, but measurements made microscopically by comparator, using glass capillary tubing inserts for markers. The neat cement bars were stored in a constant temperature cabinet, maintained at 21 deg. C. (70 deg. F.) prior to test and for one hour after their removal from the steam, when the final measurement was made.

No deductions are herein made as to the relative merits of these cements, as indicated by the results of these tests. However, the following brief observations are interesting:

1. The usual specification test of the neat cement pats did not give any indications of the relative expansive propertes of the cements. All of the cements were "sound."

2. The Le Chatelier tongs did not give very concordant results, nor did the results seem to agree very closely with those obtained by methods (c) and (d).

3. Test method (c) showed that the expansion of none of the cements was great compared with what might be expected of those cements which would prove to be "unsound" in the specification tests of pats. However, the tests of the bars did show that the relative expansive properties of some of the 32 cements varied widely, being grouped as follows:

Group	Number of cements in group	Expansion obtained
1	7	0.000 to 0.010%
2	12	.011 to .020%
3	7	.021 to .030%
4	5	.031 to .040%
5	1	.061%

4. In general, the results of method (c) were confirmed by method (d), but the latter method did not give such concordant results for individual tests as (c), notwithstanding the more elaborate and precise nature of the comparator instrument. It is thought that slight warping of occasional specimens may have greatly disturbed the relative directions of the glass tubing inserts. Method (d) was much more difficult and consumed more time than method (c).

5. The foregoing is based on the tests of cement mixed to a "normal consistency." The series of tests was then repeated, using a wetter mix, containing 42% of water (per cent by weight of cement). The results obtained confirmed the observations made on the specimens of normal consistency, although some slight changes would be produced in the grouping as given above.—*Technical News Bulletin*, U. S. Bureau of Standards.

Fine Crushed Rock and Gravel Roads

A NEW type of crushed rock or gravel road has been developed extensively in the west since the war, which differs from true macadam in that the close mechanical bond of the latter is not developed in the new road. Instead the fine material of the surfacing is bonded under traffic, frequently with the addition of filler or binder. Essentially, the road consists of a base course with a maximum size of about 1½ in. and a wearing surface with a maximum of an inch or less. For both courses the materials are graded from the maximum down to dust, with usually a requirement that the amounts passing a ¼-in. screen shall not exceed 35%. Care is taken that there shall be no segregation of the fine and coarse particles during construction. The road is thoroughly compacted by traffic.

It is said that the cost of this type of road averages from $4000 to $6000 for an 18-ft. roadway. This is little more than the cost of gravel roads, and is less than water-bound macadam costs. At the same time these roads are less difficult to maintain. The work of maintenance is done with a drag or scraper working over the fine material on the surface and preventing the formation of holes and corrugations.

The type of rock used for this work varies, hard crushed rock being the best, although even water-worn screened gravel has been used. Frequently a binder of clay or some other cementitious material is used to help compact the material under traffic, but the road so constructed is more likely to become rough, particularly in wet weather.

Fine crushed rock and gravel roads, if constantly maintained, may be kept smooth under auto traffic more readily than roads with coarse surfaces. However, the wear on them is more rapid, reaching an inch or more per year under moderate auto traffic, which means that some 400 cu. yd. must be replaced per mile each year.

Like all other types of stone or dirt roads, this road has three disadvantages—loss of material under traffic, dust which is a serious nuisance and the high cost of operating vehicles over it. The chief advantages of the road are its low first cost, its adaptability to different traffic conditions and the ease with which it can be maintained with ordinary skill and simple tools.—*Public Roads.*

Production of Stone in Texas in 1926

STATISTICS regarding the production of stone in Texas during 1926 have been recently compiled by the bureau of economic geology of the University of Texas in cooperation with the Bureau of Mines of the United States Department of Commerce. According to the figures obtained by these two organizations, the total valuation of stone products in the state for that year is $2,595,018. This total includes the following: Limestone, $2,210,828; granite, $186,765; basalt and sandstone combined, $197,425.

This production was in excess of that for 1925, which was as follows: Limestone, $1,898,185; granite, $178,375; basalt and sandstone, $165,800.

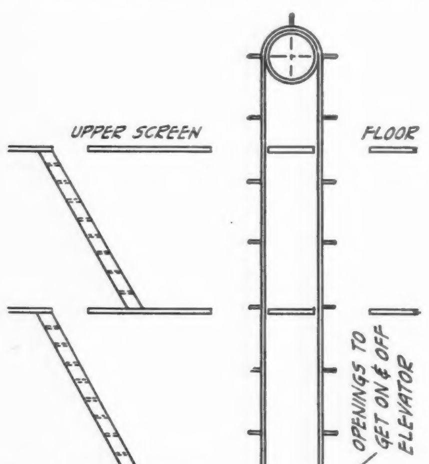
Granite was produced in 10 quarries in the central mineral region. Counties producing limestone are: Brown, Cameron, Comal, Dallas, Eastland, El Paso, Travis, Bell and Wise. Basalt is produced in Uvalde county.

Hints and Helps for Superintendents

Man Elevator of Simple Design

By W. L. HOME
Consulting Engineer, Pine Plains, N. Y.

THE vertical distance between the upper screen floor and the roll floor of a large well known western copper concentrator was quite great and originally the only way to go from one floor to the other was by way of three flights of steep, long stairs and three men were required to operate the four floors. We all know that where a place is reached only by continuous climbing of stairs or ladders that it is physically impossible for workman, foreman or superintendents to reach the place as many times in the day as they would ordinarily like to if they could reach the place with less effort. A conscientious foreman or shift boss has more stairs to climb and more steps to take than may be ordinarily appreciated. To relieve this condition the man elevator shown in the sketch was installed. After the installation two men were sufficient to operate the four floors, it tired the men less and these floors were the easiest places in the plant for foreman and others to reach. Such an installation might prove valuable to many large stone crushing plants.



Man elevator between floors saves time and fatigue

As shown in the sketch, the equipment consists of an ordinary geared drive, centrifugal discharge elevator without the buckets and with safety pawls to prevent the belt from backing up in case of power failure. The buckets are replaced by rungs about 6 ft. apart and substantially attached to the belt. There is no housing around the elevator and the floors around the up and down side of the belt are cut away to provide sufficient clearance for a man to step on one rung, hold on to another rung and pass through the opening from one floor to another stepping off at the particular floor he wishes to go.

While riding on the belt no one is allowed to carry tools of any kind. The open places in the floor have an iron railing around them so that with ordinary care on the part of the persons using the elevator the installation is quite safe and convenient.

Washing Device Which Might Be Used for Sand

THE picture at the right is from the *Brick and Clay Record* and it is a device for tempering clay. Something like it might be used with sand where it was necessary to scrub it thoroughly to remove coatings of clay, to break up small clay balls and to remove organic matter.

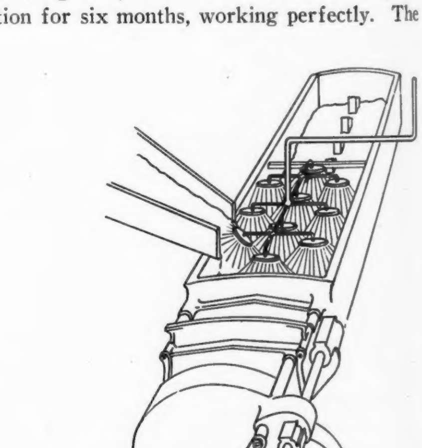
The device consists of a pug mill above which is mounted a set of sprays such as can be bought at any large hardware store. The cleaning would be by a combination of turning the material over and over while subjecting it to the action of the clay.

At the plant of the Massaponax Sand and Gravel Co., Fredericksburg, Va., a set of sprays, something like those shown here, has been found very effective in washing sand free from organic matter.

How to Straighten Gyratory Shafts

AFTER several years of operation it was found that the crusher shafts in the No. 8 crushers in the mill of the Mascot mine of the American Zinc Co. of Tennessee at Mascot, Tenn., were bent. This evidently had been caused by tramp steel, such as car wheels and boulder hammers, getting into the crusher. The large size of the mine ore did not permit of the use of a magnet or other device to prevent the tramp steel from getting into the crusher. The bend in the shaft caused the eccentric to heat so that it was necessary either to buy a new shaft or straighten what we had. Finally the conclusion was reached that if the bend had been put in the shaft in a few seconds' operation the same method could be reversed and the shaft straightened by taking a longer period of time to do it. We therefore sent the shaft to the shop, located the position of the bend and its amount, the position of the bend being marked on the top of the shaft. The shaft was then put back in the machine in operating condition. It was not allowed to revolve but was held in one position with the maximum curvature to one side of the leg of the spider so that there would be less spring to the spider and also that there would be less likelihood of breaking it. The distance between the head and the concaves was then measured by interposing cubes of lead of different size. These were measured after being slightly compressed by the stroke of the crusher, which was revolved slowly to obtain the measurement.

The first shaft straightened had three-quarters of inch bend. We were now ready to attempt straightening the shaft. This was done by interposing three 15/16-in. shafting cut to ¼-in. longer than the measurement obtained by the lead cubes. The crusher was then revolved slowly and the pieces of shafting were interposed. After three pieces had been used it was found that we had shoved the shaft back about ⅛ in. This measurement was obtained by interposing new lead cubes. The procedure was kept up until the shaft had been pushed back the full ¾ in. Apparently the shaft stood the bending cold, as it has since been in operation for six months, working perfectly. The



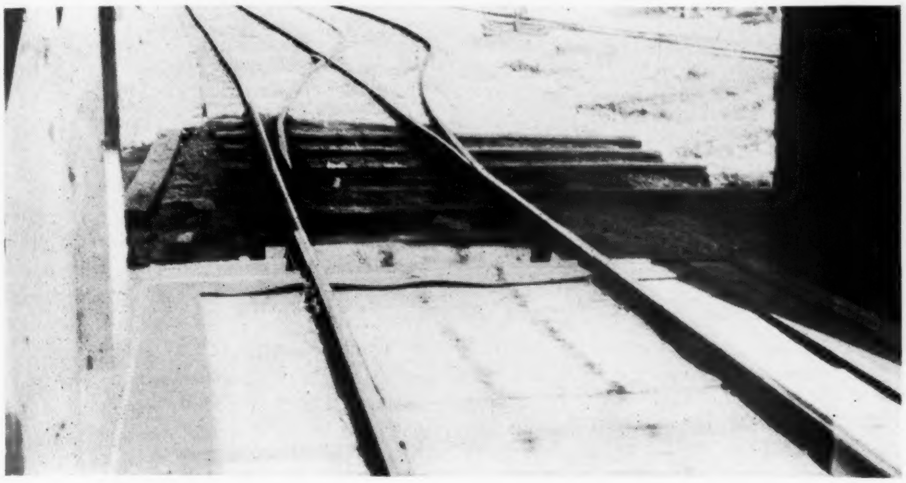
A novel scrubber adaptable to washing sand

same procedure was followed on the second shaft with satisfactory results. The value of the straightened shaft was approximately $800, whereas the cost of straightening it would not exceed $30.—*C. B. Strachan in Engineering and Mining Journal.*

Protecting Platform Scales from Dust or Weather

By JOHN W. STOCKETT, JR.
Lee Lime Corp., Lee, Mass.

AN OLD piece of rubber or heavy canvas serves as an efficient protection for platform scales at our quarry from dust, dirt, snow or rain. The strip of belting, from 4 to 6 in. wide, is tacked on top of the platform along the edges so that it laps over to the floor, thus covering the opening or clearance between the platform and the floor. In this manner the mechanism under the platform is protected and the knife edges are kept free from dust, etc. The strips do not interfere with the operation of the scales. Little pieces of stone, coal, etc., which wedge into the opening between the platform and the floor, thus interfering with correct weighing, are eliminated. The accompanying illustration shows the belting strips in place.



Dust and weather protection for platform scales

The Superintendent

By F. J. MacDONALD
Cobleskill, N. Y.

THE above heading has a world of meaning to all who require the services of such a man. His knowledge of the business at hand is all important. He should come well recommended with a wide and varied experience along the lines of his profession.

How well he succeeds and much of his company's success depends on his practical knowledge. For, as with a school teacher and preacher, we are not all cut out for superintendents. A superintendent should stand well with his "subjects." When the remarks about him are good he stands a much better chance of success.

How do you like the new super? He surely is a dandy. Every move he makes counts. He surely knows his business, etc.

Hold, Mr. Super, do not allow yourself to get too many bumps! When you get so that you know it all you are not much good to anybody. Perhaps some old experienced operator at the plant can give you some point, kink or method that you never thought possible.

I have in mind one of those know-it-all, exceptionally smart superintendents, who came well recommended (by a friend not his past employer). As an introduction he told some whopping big lies, and when it became noised around that one could not believe what he said, the high esteem that should have been his was very much reduced.

As the saying goes, give the devil his due. He claimed to be a college man and was a good draughtsman, very ambitious and a good brag. He wished for no suggestions and gave the impression that he knew it all. Of course like most of us he made mistakes, but he always tried to shirk them off on someone else. I wish to describe one particular mistake that cost the company a goodly sum in a loss of production.

At the plant was a large ball, tube mill (recently installed) and the original exhaust fan furnished with the mill was an eight-blade cumbersome affair, and gave the mill a capacity of around 2½ to 3 tons per hour, which was far below its rating. It was supposed to have a rating of as high as 13 tons per hour. Another lighter (emergency fan) had been placed, which more than doubled the capacity of the first one.

It was too light for the work and wore rather fast. The blades and arms became thin and one day an arm broke and the shaft and blades bent. A very poor botch repair job was finished at a cost of $30; and the fan did not run over 10 minutes before it went to pieces again, worse than ever.

Immediately orders were given to replace or install the original fan at another cost of $50, which cut the production of the mill in half. Orders were plenty and the mill was operated night and day for six weeks.

The production of the mill was so much reduced that many of the large orders had to be cancelled. The production loss would run as high as $4000, not saying anything about the power operating cost, which would be quite as much at a 3-ton as at a 6- to 8-ton capacity.

The botch repair required a day's work with four men, the fan change another day and a half with a gang.

Two days with a little rush would have repaired the best fan by riveting new angle iron arms on the old hubs or spiders. Boiler plate was at hand, and with a good cutting torch four blades could have been quickly made, drilled, riveted and perfectly balanced.

By the way, I wish to emphasize the importance of perfectly balancing a high speed exhaust fan. This feat is quite easily accomplished by suspending the complete fan and shaft on a pair of perfectly level, parallel, horizontal bars and adding sufficient weight (blocks or nuts) so the fan will stop and stand in any position on its periphery.

These little kinks or helps as described above would have saved or earned the company more than enough to pay this wonderful superintendent his yearly salary.

The question arises, "Do the so stubborn know it all? Do superintendents deserve or earn the fat salaries they sometimes receive?" Many of us will have to be content to do an awful lot of thinking. How much we can express our thoughts at the plant depends on the open-mindedness, or the willingness of the superintendent to listen to a good suggestion. If he is at all up-to-date, he will be looking for improvement.

I know of a modern plant where posters are stuck up asking for ideas or suggestions, and if accepted are paid for. It surely makes workers more interested.

I wish to ask a few questions: What do you think of another smart super, who instead of boarding up the large openings in the revolving screen, let the larger stone down through the bins, hired a truck at $30 per day to haul the stone around (which required the services of the company's caterpillar tractor to help up the hill), and dumped them in the small crusher? (Always before the boards had been used, and they could have been placed very quickly.)

Also what do you think of drawing stone to the crusher with three dump trucks? Is it advisable where a rail equipment is available including cars, dinkeys, rails, etc.? The crusher had a good capacity and used to run out 9 to 12 dinkey cars of 3 to 4 yd., each in 8 to 10 minutes.

Imagine a truck load every five minutes or longer. The crusher ran empty more than half the time, which wore the machinery and cost for power. Let's hear your transportation experience.

Gravel Plant Washing and Screening Equipment and Design

Part VI—Medium Sized Plant with Jaw Crusher as Primary Crusher

By Hugo W. Weimer
Consulting Engineer, Milwaukee, Wis.

THE principal equipment required for the plant proper of the average sand and gravel crushing, washing and screening plant has been illustrated and described by the writer in previous articles of this series, the first of which appeared in the July 23 issue of Rock Products. To show how the writer would proceed if requested to design a plant according to certain known factors, and the application of the details of equipment previously discussed, is the purpose of this article. To design a complete new plant the engineer not only has a choice of various makes of equipment, but types as well, and therefore the hypothetical plant that the writer is illustrating in this article may possibly be equipped quite differently and still produce the same results. Since many problems and details of the sand and gravel plants are similar to the stone crushing industry, it will benefit the interested readers to refer also to the series of thirteen articles relating to crushing and screening equipment and design of stone crushing plants, compiled by the writer, which appeared in Rock Products during the year 1926.

Operating Conditions in Hypothetical Plant

The owner of a certain tract of gravel land had made numerous test holes and has found that the average screen analysis of the pit run material would be about as given in table No. 1. While some large boulders

TABLE NO. 1—SCREEN ANALYSIS OF PIT RUN MATERIAL

—¼ in.	40%
+¼ in. —2½ in.	20%
+2½ in. —4 in.	25%
+4 in.	15%

were present, it appeared as though the largest size of piece requiring crushing would be 12-in. Not only was there sufficient stone of about this size to warrant the use of a crusher having a suitable opening, but also it would be desirable to have this additional crushed material in the finished product. The plant was to have an easy average capacity of 100 tons per hour, which means that peak loads of possibly 125 to 150 tons would occur. While the samples tested seemed fairly clean, with practically no clay or other foreign material being noticeable, it was deemed necessary on account of the rigid specifications and inspection of the potential local market, to give the material a certain amount of scrubbing before the final washing and sizing.

The requirements as to the sizes of gravel to be produced were to be as given in table No. 2. Thus the plant was to be designed to crush, scrub, wash and size the material. The owner preferred to use belt conveyors

TABLE NO. 2—PRODUCT REQUIRED (Ring Size)

Sand	—¼ in.
Pea gravel	+¼ in. —½ in.
Gravel	+½ in. —1¼ in.
Gravel	+1¼ in. —2½ in.

as a means of conveying and elevating the sand and gravel. Water was available in sufficient quantity and the plant site was about level. As to how the material would be handled in the pit will not be discussed in this article, because that is a separate problem and will be taken up in succeeding articles. We will assume that the pit run material of a size not exceeding 12 in. in thickness will by some means be delivered to a point where the plant itself begins.

Crushing Equipment

One of the first points to decide is the crushing equipment. We have a problem that demands the crushing of rather large material and with a capacity that is comparatively small, and it is evident that the entire reduction cannot be made in one machine. To use a gyratory crusher for the first break would mean that the size which would have to be at least a No. 7½ or 15-in., would be entirely out of proportion to the balance of the plant. We will therefore look to the jaw crusher, and from various literature find that a size having an opening 24x15-in. can be purchased. We will choose this size and type of crusher, which will have sufficient capacity providing the fines are removed.

For the secondary crusher, which will be required to do the fine crushing, we know that we will not require a feed opening any greater than 6 in. with the jaw crusher preceding same. Having decided that we will require two crushers, we will also determine to lay out the plant so that all the crushing is performed before the material is delivered to the washing and sizing screen. This means that the secondary crusher should be operated in connection with a scalping screen.

Since the jaw crusher must be relieved of the fine material in the pit run it will be necessary to place a grizzly ahead of same, having 4-in. spaces, which, we are reasonably sure, will not pass any material that would not easily enter the feed opening of the secondary crusher. For the jaw crusher we would have a discharge opening of about 3½ in., which would produce a product about the same as that passing through the grizzly and not crowd the jaw crusher for capacity.

Conveyors

The material passing through the gyratory and jaw crusher would then be delivered to a belt conveyor which would discharge the product into the scalping screen. This conveyor will be required to handle rather large material, but not any great capacity. In this case the size of the material would determine the necessary width, which the writer would recommend, as 24 in., with a belt speed not exceeding 250 ft. per minute.

Screens

In view of the fact that the secondary crusher will operate in a closed circuit with the scalping screen, this screen should be of ample diameter and length. The tonnage to be handled requires a 48-in. diameter and a length of 12 ft. should be sufficient. Table No. 2 indicates that the maximum ring size of gravel is to be 2½ in., therefore we will be justified in having 2¾-in. round perforations in the scalping screen, which should have steel screen section ⅜ in. thick, and we will be reasonably certain that no material larger than 2½-in. ring size will pass through same.

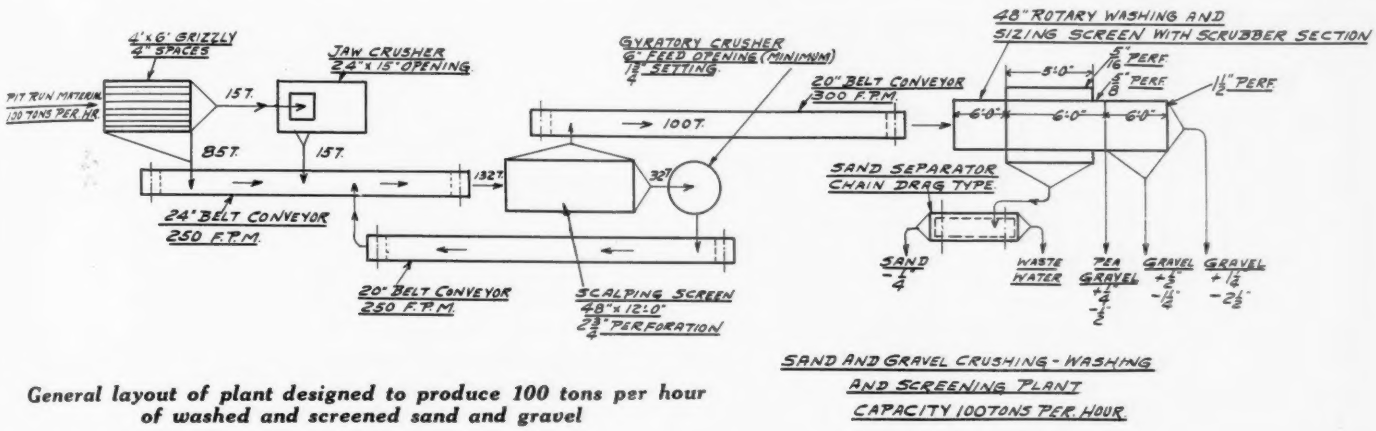
From the screen analysis given in table No. 1 we note that 15% of the feed, or 15 tons, is over 4 in. and will be crushed by the jaw crusher, and that 25% ranges in size from 2½ to 4 in., which means that 25 tons will have to be taken care of by the secondary crusher and allowing about seven tons from the jaw which will require further crushing, we will be safe in assuming that the secondary crusher must have a capacity to take care of 32 tons when set, so that, theoretically at least, no material will return a second time to the crusher. To produce this result the crusher should be set with a 1¾-in. discharge opening on

the open side. There are a number of excellent designs of gyratory crushers particularly made for this class of work which have the required feed opening of 6 in. and will produce the tonnage required.

The discharge from the secondary crusher will be taken by another belt conveyor and returned to the first conveyor, which will again carry the material into the scalping screen. All of the material passing through the screen perforations of the scalping screen is finished product and will be carried by means of another belt conveyor up to the washing and sizing screen located on top of the storage bins. Since the first conveyor is 24 in., we can assume that a 20-in. width will be sufficient for delivering the material to the washing screen, and by referring to one of the many published belt conveyor capacity tables we find that this width will have ample capacity when operated at a speed of 300 ft. per minute. The belt conveyor returning the material from the secondary crusher we will also make 20 in. in order to make it interchangeable with one of the others, and run it at a speed not exceeding 250 ft. per minute. It will have more than ample capacity, but as it is a comparatively short conveyor, we will be justified in using the 20-in. width.

TABLE NO. 3—POWER REQUIREMENTS

Equipment	Hp. Motor Required
1—4x6-ft. grizzly	
1—24x15-in. jaw crusher	25
1—24-in. x 60-ft. belt conveyor	5
1—48-in. x 12-ft. screen	10
1—Gyratory crusher	50
1—20-in. x 50-ft. belt conveyor	5
1—20-in. x 120-ft. belt conveyor	10
1—48-in. x 10-ft. screen and	
1—Sand separator	20
Total hp. of motors	125



General layout of plant designed to produce 100 tons per hour of washed and screened sand and gravel

Plant Flexibility

The tonnage again determines that the sizing and washing screen should also be 48 in. diameter, and in using this size we again make two items in the plant of similar size to allow interchangeability of parts. The owner having preferred the cylindrical type of screen because of its compactness, requiring the minimum amount of head room, we will figure on using a screen similar to that shown in Part No. II of this series of articles published in ROCK PRODUCTS, August 20, as shown on page 71. Having been advised that a certain amount of scrubbing will be necessary, we will fit this screen with the scrubber section 6 ft. long. In table No. 2 we note that the sand, which will all be minus ¼ in., must be removed, and will use an outer jacket 5 ft. long for this purpose. The first main section of the screen we will make 6 ft. long with ⅝-in. round perforations, which will allow the passing of all gravel minus ½ in., and that which remains on the jacket will be the pea gravel. It is necessary to make this section about 12 in. longer than the sand jacket so that space will be provided to properly spout the pea gravel. The next section will be 6 ft. long, which is probably longer than necessary, and provided with 1½-in. round perforations, which will produce material between ½-in. and 1¼-in. ring size. The material discharged over the end of the screen will be between 1¼ and 2½ in. in size.

The sand and water as it comes from the screen jacket will also require further treatment, not so much for the washing of the sand as to remove the sand from the water with the minimum amount of moisture. There are a number of devices which will do this work, as shown in Part No. III of this series of articles, but the owner has expressed his desire to use a drag type illustrated in Fig. 1 in the article mentioned.

Power Requirements

We have now determined on the main items required for this gravel plant and have based our conclusions on previous experience and data available, and assuming the lengths required for the belt conveyors we can compile table No. 3, which lists the equipment and also the horsepower of the motors required to operate that portion of the plant described in this article. It is not the intention of the writer to infer that another arrangement cannot be used to produce the same results, but to illustrate a method that can be used in determining, at least in a preliminary way, what equipment would be required for a certain plant and the general arrangement.

Columbia Quarry Co. Makes Improvements

THE COLUMBIA QUARRY CO. of St. Louis, Mo., of which E. J. Krause is president, has made a number of important improvements in its quarries in Illinois and Oklahoma. At the No. 1 quarry, at Krause, Ill., a new 50-B Bucyrus shovel, electrically driven, has been installed for stripping. A battery of Hum-mer screens has been added to the screening plant.

The operation at Valmeyer, Ill., has been changed from an open quarry to an underground operation. This has improved the work in several ways. Stripping, which was beginning to be expensive, and would be increasingly expensive each year, is obviated. The transportation problem is simplified by cutting out a bad grade and lessening the distance to be traveled, and washing the stone could be discontinued, as only pure limestone comes from the mine. This is important, as a very high standard of cleanliness had to be maintained with the output at this quarry, as it is largely used for chemical purposes. Plymouth locomotives are used for transportation.

An interesting feature of this operation is the size of a specially built ⅜-yd. electric underground shovel. This was made by the Bucyrus Co. and its performance has already exceeded what the makers said it would do. The best day's record is 580 yd. loaded in 7½ hr.

The company recently purchased the quarry and plant of the Zenith Stone Co., Tulsa, Okla., and it is making a number of improvements there. A 50-B Bucyrus electric shovel has been installed in the place of the steam shovel (gas fired) which was previously used. Side-dump cars are to be used in the place of the standard gage flat cars with scraper discharge previously in use. Plymouth gasoline locomotives will be used in the place of steam dinkies.

Several crushers for crushing the larger sizes and oversize will be installed.

Pacific Coast Cement Company Organized to Build Seattle Mill

THE Pacific Coast Cement Co. has been formed by the Pacific Coast Co., large operators of various industrial enterprises, for the financing and operating of a 1,000,000-bbl. cement plant to be erected in Seattle, Wash. The new company will have an authorized capitalization of $3,000,000 first mortgage 6% bonds, 20,000 shares of no par preferred and 100,000 shares of no par common, of which $2,000,000 of bonds, 7500 shares of preferred and all of the common will be issued initially. The Pacific Coast Co. will own approximately 70% of the outstanding stock. The plant will be alongside deep water navigation and will be served by five railroads. Limestone will be brought from Dall Island, southeastern Alaska.

The new cement company will begin construction of a two-kiln plant soon after the first of the year on a 19-acre site fronting 560 feet on the Duwamish waterway and lying south of Spokane street on East Marginal way.

The plant will be built to produce 1,000,000 bbl. of cement annually, with provision for future expansion of the units and plant additions to take care of increased requirements up to 3,000,000 bbl. annually, it was stated by President Barnum.

The limestone material which forms the basic raw material will be brought by water from Dall Island, which lies about 65 miles west of Ketchikan, Alaska. The distance is approximately 600 miles.

In connection with transportation of the limestone the Pacific Coast Cement Co. has signed a firm contract with the Pacific Coast Steamship Co., another subsidiary of the Pacific Coast Co. which has been inactive since 1916 as a ship operator when sale of its vessels and equipment was made to the H. F. Alexander shipping interests, for the movement of the limestone from tidewater at Dall Island to the Seattle plant at a cost of less than $1.00 a ton.

The Pacific Coast Steamship Co. will purchase from the United States Shipping Board two steamships with coal burning equipment and having a 6300-ton deadweight capacity. Negotiations are now under way for purchase of the ships, and rock will begin moving from the quarries on Dall Island to the pile at the Seattle plant by the middle of next summer. A supply will be accumulated in advance of the beginning of operations by the plant, it was stated.

The projected cement plant will be the first in the Pacific Northwest to bring its raw materials over so great a distance as 600 miles and the first to place a plant in the center of its distributing area, it was pointed out.

Contracts have been signed for other materials necessary to the production of cement. The fuel for the new plant will be supplied by the mines of the Pacific Coast Coal Co., which is also a subsidiary of the Pacific Coast Co. The fuel will be of a grade difficult to dispose of in this territory because of low commercial value. The haul from mine to the plant will be approximately 15 miles.

The limestone rock will be crushed at the quarry on Dall Island to small size, loaded by belt conveyor on shipboard and unloaded at the plant by especially designed clamshell shovel.

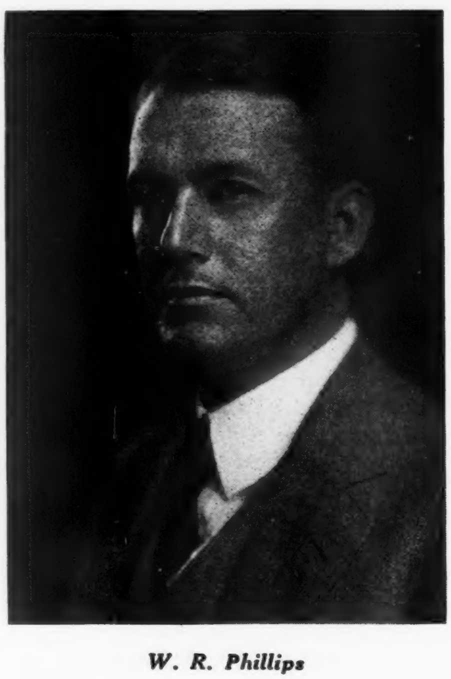
The crusher and quarry equipment will be electrically driven with power from the company's own plant which will be installed. Electrically operated shovels will load the rock in the quarry. A force of some 30 men will be employed on the island operations.

The new Seattle plant will be of steel and reinforced concrete construction. The wet process of grinding will be used in the mill and the latest designed machinery installed for dust collection.

Associated with the Pacific Coast Co. will be the Cowham Engineering Co. of Chicago, through the ownership of a substantial investment in the junior securities of the cement company. The engineering company will be represented on the directorate of the cement company by John L. Senior, its president, who will have general supervision of the construction and design of the plant and will act in an advisory capacity after completion.

The officers of the cement company will be the present executives of the Pacific Coast Co. and its subsidiaries: Walter Barnum, president; E. C. Ward, first vice-president; N. D. Moore, second vice-president; Wylie Hemphill, general sales manager.

[A $2,000,000 bond issue underwritten by a syndicate composed of Taylor, Ewart & Co., Inc., Geo. H. Burr, Conrad & Broom, and the Marine National Co. has been offered for sale. Complete details will be given in the financial pages of a later issue.]



W. R. Phillips

F. M. Pinnegar and W. R. Phillips in a New Enterprise

TWO MEN well-known in the lime industry have evidently decided some other field offers a better opportunity at the present time. They are F. M. Pinnegar, a former sales manager of the Kelley Island Lime and Transport Co., Cleveland, Ohio,

F. M. Pinnegar

and later general manager of the Palmer Lime and Cement Co., New York City, and W. R. Phillips, a former general manager of the American Lime and Stone Co., Bellefonte, Penn., and more recently general manager of the New England Portland Cement and Lime Co., Thomaston, Maine; they are now president and secretary-treasurer, respectively, of the Greater Windsor Development Co., Windsor, Ont.

The Greater Windsor Development Co. is sponsoring a $600,000 real estate development in Windsor, to consist of a 64-family apartment building and a 300-car ramp garage. The apartments are to be fireproof, equipped with electric refrigeration, radio, and all other ultra-modern improvements. It is presumed lime plaster will be used throughout!

Thomas L. Holland, of Detroit, Mich., is associated with Messrs. Pinnegar and Phillips in the enterprise. Mr. Holland for 12 years was with the Foundation Co., New York City, and will be superintendent of construction.

When the new Windsor-Detroit bridge is completed, it is expected that Windsor will become more than ever a suburb of Detroit. In any event, it is becoming fashionable and advantageous for Detroit citizens to have domiciles in Canada, as well as in "the land of the free and the home of the brave."

Editorial Comment

Applying a Code of Ethics

In ROCK PRODUCTS of March 5, 1927 (pp. 84-85), was published a "code for the maintenance of fair prices" drawn up and adopted by the National Fertilizer Association, and approved, so far as such things can be, by the Department of Justice of the United States. We know that this code was widely read by rock products manufacturers at the time, as it naturally would be, since their sales problems are nearly identical with those of fertilizer manufacturers; and any discussion of fair rules in the most fascinating and baffling of all games—business—is noteworthy.

The drawing up and adoption of a code of ethics by the fertilizer industry was the outgrowth of a considerable period of overproduction, senseless price-cutting—really throat-cutting—bankruptcies and receiverships. These are the almost invariable accompaniments of overproduction in an unorganized, or weakly organized, industry; or of an industry in which there are enough "weak sisters" to demoralize the entire group.

The only good the price-cutters hope to accomplish is to "freeze out" some of their weaker competitors. What really happens, if they are financially strong enough to stand the gaff themselves, is to put their competitors through receiverships which rid them of debts they would otherwise have to carry, and very likely throws their management into new and more aggressive, but less experienced hands, capable of doing the industry even more harm than that which our strong friends tried to eliminate by such desperate methods.

The other alternative in meeting a situation of overproduction, or a supply much in excess of present and prospective demand, is the *application* of a code of ethics. The "code" may be written and readable, or it may merely exist as an unwritten, uncodified understanding in the minds of a group of men of what is fair and decent in competition, and what is best for the preservation of the industry in the long run. In the case of a small group of strong men, each well-known to the others, probably a written code, and any organized attempt to adhere to it, is unnecessary. Unfortunately, we have few such groups in American industry—the steel industry being perhaps the most notable example.

Probably it is not a difficult thing to get a convention of a national trade, or business, association to adopt a code of ethics. But adoption is one thing and application is another, as we all know, for example, is the case with Christianity itself. Therefore, even more important than the code itself is any suggestion of how it may be made a real factor in business. Hence the following, from a letter signed by the executive secretary of the National Fertilizer Association, and sent to all those who signed the code of ethics, is helpful:

> Your president and board of directors feel that the salvation of the industry lies in close adherence to the principles laid down in the code, which after all only outlines sound and common-sense business methods.
>
> By unanimous resolution the board directed that a letter be sent to all members of the association and to all non-members who signed the code, urging them to give the code a full and fair trial this year, and to see that their agents, salesmen and employees also abide strictly by its provisions. You are urged to write to your salesmen and impress upon them the value and the necessity of observing the code, and to send them copies of it for their guidance.
>
> The board also considered ways and means for promoting the observance of the code and for deciding questions arising out of its interpretation. It was resolved to adopt the following method:
>
> That whenever any member felt that some other member was violating any provision of the code, a full statement of the facts should be laid before the executive secretary and treasurer. The executive secretary and treasurer will then write the member complained against to afford him an opportunity to make a full and complete response to the charges preferred against him. As quickly as the facts are obtained from both complainant and respondent, the executive secretary will lay the whole case before the general counsel of the association, and an interpretation of the provision of the code involved will be made, and a decision based upon the facts will be submitted to both parties.
>
> From time to time as interpretations of the code are made, they will be forwarded to all the members, omitting the names of the parties in each case, so that everyone may be kept as fully informed as possible.
>
> The board also directed that meetings of the industry shall be held in all districts prior to the opening of the fall season, for the purpose of discussing the code; bringing to light any points upon which difference of opinion may exist in order that they may be referred to Washington for interpretation; and securing renewed adherence. These meetings will be attended by your executive secretary, and all signatories to the code, whether members of the association or not, and all other interested persons, are cordially invited to attend. Notices of these meetings will be sent out later as soon as a schedule can be prepared.
>
> In conclusion, the members of all the district committees are urged to do everything in their power to promote interest in the code, to obtain additional signatories, and to stimulate attendance at the coming meetings. Only by determined cooperation can we hope to overcome the difficulties which beset us, and to restore our industry once more to a business-like, profit-making basis.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Allentown Portland Cement Co. (common)[32]	Dec. 5	....	3½	7½	
Allentown Portland Cement Co. (6% bonds, 1932)[32]	Dec. 5	....	90	92	
Alpha Portland Cement Co. (common)[2] new stock	Dec. 5	No par	33	36	75c quar. Oct. 15
Alpha Portland Cement Co. (preferred)[2]	Dec. 5	100	112	115	1¾% quar. June 15
American Lime and Stone Co. (7% bonds, 1942)[32]	Dec. 5	....	100½	101½	
Arundel Corporation (sand and gravel—new stock)	Dec. 6	No par	48¾	48¾	50c Oct. 1
Atlantic Gypsum Products Corp. (1st 6's carrying 10 sh. com.)[10]	Dec. 7	....	110	115	
Atlas Portland Cement Co. (common)[2]	Dec. 3	No par	40	43	50c qu. Sept. 1
Atlas Portland Cement Co. (preferred)	....	100	....	....	2% qu. Oct. 1
Atlas Portland Cement Co. (preferred)[2]	Dec. 5	33⅓	43	....	2% qu. Oct. 1
Beaver Portland Cement Co. (1st Mort. 7's)[5]	July 29	100	100	100	
Bessemer Limestone and Cement Co. (Class A)[4]	Nov. 22	....	38½	39	75c quar. Oct. 31
Bessemer Limestone and Cement Co. (6½% bonds)[4]	Nov. 4	....	100¼	101	
Bessemer Limestone and Cement Co. (common)	....	....	....	....	75c quar. Oct. 31
Boston Sand and Gravel Co. (common)	Dec. 3	100	78	79¾	1% qu., 2% ex. Jan. 1
Boston Sand and Gravel Co. (preferred)	Oct. 21	....	85	90	1¾% quar. Jan. 1
Boston Sand and Gravel Co. (1st preferred)	Oct. 21	....	90	95	2% qu. Jan. 1
Canada Cement Co., Ltd. (common)	Nov. 19	100	246	....	1½% quar. Oct. 17
Canada Cement Co., Ltd. (preferred)[11]	Nov. 19	100	122	....	1¾% quar. Nov. 16
Canada Cement Co., Ltd. (1st 6's, 1929)[11]	Nov. 19	....	101½	102½	3% semi-annual A&O
Canada Cement Co., Ltd. (new common)	Dec. 6	....	34	35	
Canada Cement Co., Ltd. (new preferred)	Dec. 2	....	98½	99	
Canada Cement Co., Ltd. (new units)	Nov. 4	....	107	107½	
Canada Crushed Stone Corp., Ltd. (6½s, 1944)[11]	Nov. 19	100	96	99	
Charles Warner Co. (lime, crushed stone, sand and gravel)	Dec. 5	No par	37	40	50c Oct. 10
Charles Warner Co. (preferred)	Dec. 5	100	110	....	1¾% quar. Oct. 27
Cleveland Stone Co. (new stock)	Dec. 6	....	65¼	66	50c qu. 50c ex. Dec. 1
Connecticut Quarries Co. (1st Mortgage 7% bonds)[17]	Dec. 3	100	105	....	50c qu. June 15
Consolidated Cement Corp. (1st Mort., 6½s, series A)[24]	Dec. 8	100	96	99	
Consolidated Cement Corp. (5 yr. 6½% gold notes)[24]	Dec. 7	100	94	98	
Consumers Rock and Gravel Co. (1st Mort. 7s)[18]	Dec. 2	100	99½	101½	
Coosa Portland Cement Co. (6% bonds, 1944)[32]	Dec. 5	....	69	70	
Coplay Portland Cement Co. (6% bonds, 1941)[32]	Dec. 5	....	88	92	
Dewey Portland Cement Co. (1st mort. 6's 1942)[30]	Dec. 7	100	99	101	
Dolese and Shepard Co. (crushed stone)[7]	Dec. 6	50	107	110	1.50 Jan. 1, 1.50 ex. Jan. 1
Edison Portland Cement Co. (common)[39]	Dec. 5	....	25c	50c	
Edison Portland Cement Co. (preferred)[39]	Dec. 5	....	50c	1½	
Edison Portland Cement Co. (bonds)[39]	Dec. 5	....	70	....	
Egyptian Portland Cement Co. 7% pfd.[21]	Dec. 2	....	90	95	1¾% quar. July 1
Egyptian Portland Cement Co. (common)[21]	Dec. 2	....	5	7	40c quar. Oct. 1
Egyptian Portland Cement Co. (warrants)	Dec. 2	....	No market		
Fredonia Portland Cement Co. (6½% bonds, 1940)[32]	Dec. 5	....	97	101	
Giant Portland Cement Co. (common)	Dec. 5	50	40	45	
Giant Portland Cement Co. (preferred)	Dec. 5	50	40	45	3½% Dec. 15
Ideal Cement Co. (common)	Dec. 6	No par	95	97	$1 quar. Oct. 1
Ideal Cement Co. (preferred)[33]	Dec. 5	100	110	112	1¾% quar. Oct. 1
Indiana Limestone 7's (1936)	Nov. 9	....	98	100	
International Cement Corporation (common)	Dec. 6	No par	56½	57	$1 quar. Dec. 31
International Cement Corporation (preferred)[2]	Dec. 6	100	111	112	1¾% quar. Dec. 31
Kelley Island Lime and Transport Co. (new stock)	Dec. 6	100	52	52½	$2 quar., $2 ex. Oct. 1
Lawrence Portland Cement Co.[2]	Dec. 5	100	105	107½	2% quar.
Lehigh Portland Cement Co.	Dec. 5	50	127	130	1½% quar.
Lehigh Portland Cement Co. (preferred)	Oct. 24	....	73	78	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1928 to 1931)[13]	Aug. 12	100	99½	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1932 to 1935)[13]	Aug. 12	100	97½	99	
Marblehead Lime Co. (1st Mort. 7's)[14]	Dec. 2	100	100	....	
Marblehead Lime Co. (5½% notes)[14]	Dec. 2	100	98	....	
Michigan Limestone and Chemical Co. (common)[6]	Dec. 5	....	35	....	
Michigan Limestone and Chemical Co. (preferred)[6]	Dec. 5	....	24	26	1¾% quar. July 15
Missouri Portland Cement Co.	Dec. 6	25	37½	38	50c Nov. 1
Monolith Portland Cement Co. (common)[9]	Dec. 1	....	12¾	13¼	8% ann. Jan. 2
Monolith Portland Cement Co. (units)[9]	Dec. 1	....	31¾	33¼	
Monolith Portland Cement Co. (preferred)[9]	Dec. 1	....	9½	10	
National Cement Co. (7% bonds)[38]	Nov. 21	100	95	97	
National Gypsum Co. (common)[35]	Dec. 6	....	31	34	
National Gypsum Co. (preferred)[35]	Dec. 6	....	75	78	
National Gypsum Co. (pref. carrying acc. div.)[35]	Sept. 15	....	86	88	
Nazareth Cement Co.[20]	Dec. 2	No par	32	34	75c quar. Apr. 1
Newaygo Portland Cement Co.[1]	Nov. 18	....	115	....	
Newaygo Portland Cement Co. (6½% bonds, 1938)[32]	Dec. 5	....	102	104	
New England Lime Co. (Series A, preferred)[14]	Nov. 18	100	....	95	
New England Lime Co. (Series B, preferred)[22]	Dec. 5	100	97	99	
New England Lime Co. (V.T.C.)[22]	Dec. 5	....	33	35	
New England Lime Co. (6s, 1935)[14]	Dec. 2	100	98	100	
New York Trap Rock Corp. (6% bonds, 1946)[32]	Dec. 7	....	102	102	
North American Cement Corp. 6½s 1940 (with warrants)	Dec. 6	100	81	81	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common)[32]	Nov. 18	....	35	40	2 mo. period at rate of 7%
North American Cement Corp. (common)[19]	Apr. 9	....	8⅛	9	
North American Cement Corp. (preferred)	Apr. 25	....	....	....	1.75 quar. Aug. 1
North Shore Material Co. (1st Mort. 6's)[15]	Dec. 7	100	98½	....	
Northwestern States Portland Cement Co.[37]	Nov. 21	....	165	170	

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by True, Webber & Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hemphill, Noyes & Co., New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]William C. Simons, Inc., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder,, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York.

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS (Continued)

Stock	Date	Par	Price bid	Price asked	Dividend Rate
Pacific Portland Cement Co. (common, new stock)	Dec. 5		30		
Pacific Portland Cement Co., Consolidated[5]	Oct. 21	100	61¾		25c mo.
Pacific Portland Cement Co., Consolidated (preferred)	Dec. 5		81		
Pacific Portland Cement Co., Consolidated (secured serial gold notes)[5]	Oct. 20	100	98½		3% semi-annual Oct. 15
Peerless Portland Cement Co.[1]	Nov. 18	10	4¾	5⅛	
Pennsylvania-Dixie Cement Corp. (1st Mort. 6's)[29]	Dec. 6	100	98½	98¾	
Pennsylvania-Dixie Cement Corp. (preferred)[28]	Dec. 7	100	95	97½	1¾% Jan. 3
Pennsylvania-Dixie Cement Corp. (common)[28]	Dec. 6		24	25	60c Jan. 3
Petoskey Portland Cement Co.[1]	Dec. 6	10	11½	12¼	1½% quar.
Pittsfield Lime and Stone Co.[31]	Oct. 8			100	
Pittsfield Lime and Stone Co.[31] (common)	Oct. 8			25	
Riverside Portland Cement Co.	May 9		165		50c monthly, $1.50 ex. Aug. 1
Rockland and Rockport Lime Corp. (1st preferred)[34]	Dec. 3	100	101		3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred)[34]	Dec. 3	100	40	60	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common)[34]	Dec. 3	No par		50	1½% quar. Nov. 2
Sandusky Cement Co. (common)[1]	Dec. 6	100	125	125	$2 quar. Oct. 1
Santa Cruz Portland Cement Co. (bonds)[5]	Oct. 20		105½		6% annual
Santa Cruz Portland Cement Co. (common)[5]	Dec. 5		85½		$1 quar., $1 ex. Jan. 1
Schumacher Wallboard Corp. (common)	Dec. 5		21½	22	
Schumacher Wallboard Corp. (preferred)	Nov. 18		25½	25¾	
Southwestern Portland Cement Co. (units)	May 11		205		
Superior Portland Cement, Inc. (Class A)[20]	Dec. 5		47½	48½	
Superior Portland Cement, Inc. (Class B)[20]	Nov. 17		30	33	
Trinity Portland Cement Co. (units of 1 sh. pfd. and ½ sh. com)[37]	Dec. 3		155	160	
Trinity Portland Cement Co. (common)[37]	Dec. 3		50		
United Fuel and Supply Co. (sand and gravel) 1st Mort. 6s[27]	July 14	100	98	100	
United Fuel and Supply Co. (sand and gravel) 6% gold notes[27]	July 14	100	98	100	
United States Gypsum Co. (common)	Dec. 6	20	88½	89½	40c qu. $1 ex. Dec. 31
United States Gypsum Co. (preferred)	Dec. 6	100	122		1¾% quar. Dec. 31
Universal Gypsum Co. (common)[3]	Dec. 7	No par	3½	4	
Universal Gypsum V.T.C.[3]	Dec. 7	No par	3	3½	
Universal Gypsum Co. (preferred)[3]	Dec. 7		32	35	1½% Feb. 15
Union Rock Co. (7% serial gold bonds)[18]	Oct. 7		Called as of Nov. 1, 1927		
Upper Hudson Stone Co. (1st 6's, 1951)[32]	Dec. 3		97	99	
Upper Hudson Stone Co. (1st 6's, 1937)[32]	Dec. 5		94	99	
Vulcanite Portland Cement Co. (7½% bonds, 1943)[32]	Dec. 5	100	105	109	
Whitehall Cement Mfg. Co. (common)[36]	Dec. 3		150		
Wisconsin Lime and Cement Co. (1st Mort. 6's, 1940)[15]	Dec. 7	100	99	101	
Wolverine Portland Cement Co.	Dec. 6	10	5¼	6	15c Nov. 15
Yosemite Portland Cement Co. (Class A, common)	Dec. 3		6		

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Dividend Rate
Asbestos Corp. of America (5 sh. pfd. and 5 sh. com.)[1]	June 22		$1 for the lot		
Atlanta Shope Brick and Tile Co.[1]	Nov. 24		25c		
Benedict Stone Corp. (cast-stone) (50 sh. pfd. and 390 sh. com.)[1]	Dec. 29		$400 for the lot		
Blue Stone Quarry (60 shares)[2]	Mar. 16		$10¼ for the lot		
Coplay Cement Mfg. Co. (common)[4]	Dec. 16		12½		
Coplay Cement Mfg. Co. (preferred)[1]	Dec. 30		70		
Eastern Brick Corp. (7% cum. pfd.)[1]	Dec. 9	10	40c		
Eastern Brick Corp. (sand lime brick) (common)[1]	Dec. 9	10	40c		
International Portland Cement Co., Ltd. (preferred)	Mar. 1		30	45	
Globe Phosphate Co. ($10,000 1st mtg. bonds, $169.80 per $1000 paid on prin.)	Dec. 22		$50 for the lot		
Iroquois Sand and Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.)[1]	Mar. 17		$12 for the lot		
Knickerbocker Lime Co.(x)	June 22		100		
Limestone Products Corp. (150 sh. pfd., $50 par, and 150 sh. com., no par)	Dec. 22		$60 for the lot		
Missouri Portland Cement Co. (serial bonds)	Dec. 31		104¾	104¾	3¼% semi-annual
Olympic Portland Cement Co.(g)	Oct. 13			£1⅝	
Phosphate Mining Co.[1]	Nov. 24		1		
River Feldspar and Milling Co. (50 sh. com. and 50 sh. pfd.)[1]	June 23		$200 for the lot		
Rockport Granite Co. (1st 6's, 1934)	Aug. 31		90		
Simbroco Stone Co.[2]	Apr. 20		12	12	
Southern Phosphate Corp.[6]	Sept. 15		1¼		
Tensas Gravel Co. (180 sh. com.)[1]	Nov. 17		$1 for the lot		
Tidewater Portland Cement Co. (3000 sh. com.)	Dec. 22		$6525 for the lot		
Vermont Milling Products Co. (slate granules) 22 sh. com. and 12 sh. pfd.)[6]	Nov. 3		$1for the lot		
Wabash Portland Cement Co.[1]	Aug. 3	50	60	100	
Winchester Brick Co. (preferred) (sand lime brick)[5]	Dec. 16		10c		

(g) Neidecker and Co., Ltd., London, England. [1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price obtained at auction by R. L. Day and Co., Boston. [3]Price obtained at auction byWeilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, Penn. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass.

Florida Portland Bonds Offered

E. H. ROLLINS & SONS, Chicago, Ill., are offering $1,750,000 Florida Portland Cement Co. 6½% first mortgage sinking fund gold bonds at 99 and interest to yield over 6.70%. Dated October 15, 1927. Due October 15, 1932.

The following data are from a letter of John L. Senior, president of the Florida Portland Cement Co.:

The Florida Portland Cement Co. was incorporated in 1925 under the laws of Delaware for the purpose of owning and operating plants engaged in the manufacture and distribution of portland cement. The company has recently constructed a modern cement plant, located at Tampa, Fla., with a productive capacity of 1,500,000 bbl. per annum, which plant commenced operation October 1, 1927, and at present all departments are in operation. The company's plant is situated on a tract of land of approximately 25 acres, which the company owns in fee, located within the city limits of Tampa on Hooker's Point.

The company's manufacturing facilities are of the most modern and approved character and the layout of the plant is such as to provide the most efficient and economical operation. The plant has its own power station with a total installed capacity of over 6000 hp. which furnishes all of the power required in operating the plant and property. It is interesting to note that the power plant equipment has sufficient power capacity to supply a community of 22,000 inhabitants with power and light. Storage facilities provide for 141,000 bbl. of finished cement and there are ample facilities for the storage of stone, clay, coal, clinker and gypsum.

The company's raw material deposits, owned in fee, are located near Brooksville, about 50 miles north of Tampa, served by the Tampa Northern Railroad Co. (a subsidiary of the Seaboard Air Line Railway Co.). This property consists of approximately 400 acres of high-grade limestone, which has been fully developed and will, it is estimated, provide the plant with its stone requirements at its rated capacity for 100 years. The necessary equipment for the most economical and efficient quarry operation has been installed at this point and railroad connections established from the quarry to the Tampa Northern Railroad (approximately 4 miles) so as to provide the most complete facilities for the transportation of the company's raw material to its plant. The clay deposits are located near Brooksville,

where the raw material is available in sufficient quantity and quality for the company's operations for a long period of years. The stone and clay properties are located close together so that both of these basic materials are transported daily from Brooksville to the Tampa plant.

The company is now producing a very high grade cement and has already made shipments on orders booked. The plant, being located on seaboard, will have its own docks for direct loading into ocean-going ships and barges. This will give the company the advantage of water rates as to a portion of its output into the seacoast and gulf ports of the southern states, as well as into foreign ports of the West Indies, Mexico, Central America and South America.

CAPITALIZATION

(Upon completion of present financing)

6½% first mortgage sinking fund gold bonds (this issue)	$1,750,000
7% cumulative participating preferred stock	5,000,000
Common stock (no par value), shares	75,000

Security.—These bonds are a part of a total authorized issue of $2,000,000 and, in the opinion of counsel, are secured by a direct first mortgage on all of the real estate, plants, buildings, equipment and fixed property of the company now owned or hereafter acquired subject to purchase money mortgages or underlying liens, if any, on hereafter acquired property. The actual cash cost of the plant and properties as of September 30, 1927, amounts to $5,067,672.95, which includes $173,850 of cash reserved for the development of facilities and raw materials, a substantial part of which has now been accomplished. This loan, therefore, represents a 35% mortgage.

Assets.—Balance sheet as of September 30, 1927, prepared by Mesrs. Arthur Anderson & Co., adjusted to give effect to the present financing, shows net tangible assets having a value of $5,915,248.94. Net current assets as shown in said balance sheet amount to $847,575.99.

Earnings.—On account of its efficient and modern manufacturing facilities, including waste heat boiler installation, the company has a low manufacturing cost. The company owns and operates the only cement plant in the state of Florida and therefore enjoys very substantial freight differentials, in practically the entire state, over all competitors now shipping into Florida by rail, and should be able to distribute its entire output advantageously within its natural trade territory, which now consumes about twice the annual capacity of this plant.

Careful estimates indicate that on an 80% capacity operation the company should show annual net earnings of $500,000, or about 4.4 times interest requirements and more than three times to combined interest and sinking fund requirements on these bonds.

On the basis of capacity production, normal prices for cement, and the low cost of manufacture at this plant, it is believed that the company will be able to show an annual net operating profit of over $1,000,000, which is equal to over 8½ times such interest requirements and over 6 times such interest and sinking fund requirements.

Sinking Fund.—The indenture provides for a minimum sinking fund of $50,000 per annum for the retirement of bonds of this issue, payable annually commencing October 15, 1928. In addition the company covenants to set aside, as an additional sinking fund, a sum equal to 25% of the net income of the company after depreciation, taxes, interest, minimum sinking fund payments, and preferred dividends, for the period of its operations ending December 31, 1928, and for each calendar year thereafter as provided in the indenture.

Mortgage Provisions.—Additional bonds in the amount of $250,000 may only be issued for the fair value or cost of permanent additions and improvements to the properties of the company made subsequent to November 15, 1927, provided net earnings of the company, as defined in the indenture, for the 12 consecutive calendar months within 15 calendar months immediately preceding request for issuance, shall have been at least three times the annual interest requirements on all outstanding bonds of this issue, including bonds proposed to be issued.

FLORIDA PORTLAND CEMENT CO.
BALANCE SHEET, SEPT. 30, 1927

(After giving effect to the proposed issue and sale of $1,750,000 par value first mortgage sinking fund bonds and other transactions incident thereto.)

ASSETS

Current assets:			
Cash	$835,841.60		
Less amt. required for further development of plant and quarries	173,850.00		
		$661,991.60	
Inventories of raw materials, work in process, finished cement, sacks, supplies, etc., at cost		169,198.64	
Temporary investment and sundry receivables		16,385.75	
			$847,575.99
Deferred charges, including bond discount			160,910.98
Fixed assets:			
Cost of lands, plant, quarry and properties		$4,893,822.95	
Cash reserve as above—Expenditure required for further development of quarry, purchase and development of additional clay deposits, additional equipment and dredging, as estimated by the Cowham Engineering Co.		173,850.00	
			5,067,672.95
Organization and financing expense			674,940.03
			$6,751,100.00

LIABILITIES AND CAPITAL

First mortgage 6½% sinking fund gold bonds, due October 15, 1932		$1,750,000.00
Capital:		
Preferred stock, 7% cumulative — Authorized and issued 50,000 sh. of $100 par value each	$5,000,000.00*	
Common stock, no par value—Authorized and issued 75,000 shares	1,100.00	
		5,001,100.00
		$6,751,100.00

*Dividends on preferred stock cumulative from various dates of issue from April 1, 1927.

Purpose of Issue.—The proceeds from the sale of these bonds are to be used in part to reimburse the company for capital expenditures, for the purchase of the fee of the site on which the plant is located (which has heretofore been occupied under lease) and to provide additional working capital.

Market.—During the years 1923 to 1926 inclusive an average of over 3,500,000 bbl. of cement per year have been used in Florida. The consumption in the first six months of 1927 was in excess of 1,700,000 bbl., and it is estimated that 3,000,000 bbl. will be consumed in Florida during the year ending December 31, 1927. This plant is the only cement plant located in the state, and while it is indicated that the output can be entirely consumed in the Florida territory, it is favorably located to compete in the markets of other coast states and foreign ports. Tampa, one of the largest cities within the state, can be served by truck, and rail distances throughout the state are minimized by the central location of the plant. The company will have a decided operating advantage over many plants because of the lessening of seasonal fluctuations in the construction trades in the southern states, which indicates a practically constant demand throughout the year. This will tend to minimize storage of raw materials and finished cement and will provide the advantage of continuous operation and distribution.

Management.—The property is operated by a staff of able and experienced men who have been successful in the manufacture and distribution of cement for many years. The design and construction of this plant has been under the direct supervision of the Cowham Engineering Co.

New Jersey Sand and Gravel Co. Bonds Offered

A NEW ISSUE of $300,000, 6½%, 15-year convertible sinking fund gold bonds of the New Jersey Sand and Gravel Co., Spring Lake, N. J., is being offered at 100 and accrued interest.

The following data are from a letter of J. Claude English, president of the company:

History and Business.—The New Jersey Sand and Gravel Co. has been organized under the laws of the state of New Jersey to acquire the business, assets and goodwill of the Bennett Gravel Co., Hause Washed Gravel and Sand Co., Wall Washed Sand and Gravel Co., and Wall Road Gravel Co., as of June 1, 1927. The predecessor companies have been engaged in the production of sand and gravel in the vicinity of Asbury Park and Spring Lake, N. J., their combined production in 1926 amounting to 374,332 tons. While operated independently on a profitable basis, it is anticipated that a proportionately larger volume of business and substantial operating economies will result from combined operations.

CAPITALIZATION

(Upon completion of financing)

	Authorized	To be presently outstanding
First mortgage 6½% sinking fund gold bonds, due Aug. 1, 1937	$300,000	$300,000
Convertible sinking fund 6½% gold bonds, due Aug. 1, 1942	300,000	300,000
$7 cumulative preferred stock (without par value), shares	7,500*	1,750
Common stock (without par value)	10,000	10,000

*3300 shares reserved for conversion of convertible sinking fund 6½% gold bonds.

Properties.—The properties of the Bennett Gravel Co. are east of Farmingdale, N. J., about eight miles west of Asbury Park; those of the Hause Washed Gravel and Sand Co. are located in Shrewsbury township, about three miles west of Asbury Park, and the properties of the Wall Washed Sand and Gravel Co. are in Wall township, about two miles west of Spring Lake, N. J. Following is the tabulation of acreage to be owned in fee or controlled under long term lease or license and estimate of reserve tonnage of sand and gravel:

	Owned in fee, acres	Long-term leases or licenses, acres	*Proven deposits of sand and gravel, tons
Bennett Gravel Co.	724	700	6,500,000
Hause Washed G. & S. Co.	50	98	2,380,000
Wall Washed S. & G. Co.	29	......	650,000
Wall Road Gravel Co.	25.19	......	....
	828.19	798	9,530,000

*As estimated by Ford, Bacon & Davis, Industrial Engineers.

In addition to reserves of sand and gravel, these properties are equipped with adequate washing plants, steam shovels, derricks, railroads, locomotives, cars and trucks for efficient conduct of the business.

Products and Market.—The principal products of the company will be ¾-in. gravel, ½-in. gravel, "grits" (gravel of ¼ in. and less), concrete sand and mason sand. The principal uses for the several gravel products are concrete building construction and concrete road work. The sand products enter mainly into the same uses, the so-called "concrete sand" being used in building and road construction and the "mason sand" in plastering and other interior construction requiring a finer grade of product. Blast sand is also produced from the deposits on the Bennett Gravel Co. property.

The market for the company's products extends from Keansburg, N. J., on the north; Lakewood and Point Pleasant on the south, and Freehold and Manalapan on the west, which are economically served by trucks. Railroad shipments are made throughout considerable parts of northern New Jersey, where freight rates permit, principally to Elizabeth, South Amboy, Perth Amboy, Plainfield, Phillipsburg and surrounding territory. In southern New Jersey some of the principal shipping points are Toms River, Atlantic City, Vineland and Bridgeton.

The increasing use of concrete in road work and building construction indicates an increasing market for the company's products. Only about 10% of streets and roads from Atlantic Highlands to Point Pleasant are now permanently paved. Relatively little concrete was used in local building construction in the New Jersey beach resort cities and towns until about 1925. In the last two years six large buildings have been constructed in and closely adjacent to Asbury Park, representing a total cost exceeding $7,000,000. In these building operations, considerable tonnages of washed gravel and sand have been used in concrete construction.

Convertible Sinking Fund 6½% Gold Bonds.—The convertible sinking fund 6½% gold bonds will be the direct obligation of the company and will be convertible at any time prior to maturity or in case of redemption at any time prior to the close of business on the 30th day after the first publication of notice of redemption into the $7 cumulative preferred stock of the company, without par value, at the rate of eleven shares of such preferred stock for each $1,000 bond with adjustment of interest and dividends.

The trust agreement securing these bonds will contain the following protective provisions:

(a) No additional mortgages or liens may be placed upon any of the company's properties or fixed assets, except to refund the first mortgage 6½% sinking fund gold bonds presently to be issued, or purchase money mortgages, or conditional sales contracts, or obligations maturing within one year from date, unless these bonds are equally and ratably secured.

(b) No dividends may be paid upon the common stock of the company while any of these bonds are outstanding.

(c) An annual sinking fund (first payment August 1, 1928) of 25% of the company's net earnings (as defined in the trust agreement) will be applied to the retirement of these bonds by purchase or redemption.

Assets and Earnings.—Messrs. Ford, Bacan and Davis, Industrial Engineers, have estimated that the total commercial value of the business of the company, including working capital, will be in excess of $900,000.

Net earnings of the predecessor companies, as certified to by Messrs. David Berdon & Co., for two years and six months ended June 30, 1927, available for depreciation, depletion, interest, sinking fund and federal taxes, have been as follows:

	Yr. ended Dec. 31 1925	1926	Six months ended June 30, 1927
	$137,859	$113,149	$105,365.39
Schedule of fixed charges of New Jersey S. & G. Co.			
Interest requirements on first mortgage bonds, $19,500.			
Interest requirements on convertible 6½% bonds, $19,500			
Sinking fund on first mortgage 6½% bonds, 4 cents per ton with a minimum of $20,000..	$ 59,000	$ 59,000	$ 29,500

Management.—The management of New Jersey Sand and Gravel Co. will continue in charge of experienced individuals who have been largely responsible for the success of the predecessor companies.

Combined operation is expected to result in substantially increased earnings through operating economies, elimination of competition and increased production, which in the first year is estimated in excess of 400,000 tons.

The board of directors will include Newton A. K. Bugbee, Edwin R. Conover, J. Claude English, Elmer H. Geran, Fred Hause, Charles Lawrence, Taulman A. Miller, David Newman and Russell Yawger.

Lehigh Portland Cement Plans $13,000,000 Stock Distribution

THE stockholders will vote December 16 on increasing the authorized capital stock from $30,000,000 to $60,000,000. President E. M. Young is quoted:

"It intended that said additional stock shall consist of 300,000 shares of 7% preferred stock (par $100 each), cumulative from January 1, 1928, and redeemable all or part on any dividend date at 110 and dividends on 30 days' notice.

"The outstanding capital stock of the company is $22,517,400, divided into 450,348 shares of common stock, par $50 each. On November 30, 1926, which was the end of the last fiscal year, the accumulated surplus was $26,556,378. Since this surplus is necessary for the purposes of the company, it seems to the directors to be advisable to create a capital stock structure which will enable the corporation to readjust its liability to its shareholders through the declaration of a dividend payable in preferred stock. If the vote of the stockholders be in the affirmative with respect to the proposed increase in the authorized capital stock, the way will be prepared for the transfer from the surplus account of the company to its capital stock account, of any sum which may be fixed by due corporate action, and for the declaration of a preferred stock dividend for an aggregate in par value equal to amount so transferred. The transfer from surplus to capital stock account of an amount equal to the aggregate par value of the common stock outstanding would make provision for and would warrant a dividend of one share of preferred stock for every two shares of outstanding common stock. If the stockholders will authorize the increase, the matter of the declaration of a stock dividend will either be submitted for action at said meeting of the shareholders or will be left for decision to the board of directors."

Commenting on the plan, the New York *Times* says:

"This company has been mentioned in merger rumors for some month, but nothing has come of the negotiations. Control of the company rests with a few officers, who have been unwilling to part with their stock at a price which the bidders were willing to pay. The new plan for recapitalization may be preliminary to another effort to arrange a merger."

Yosemite Portland Increases Common Stock Issue

THE stockholders of the Yosemite Portland Cement Corp. recently increased the authorized class A common stock (par $10) from $2,000,000 to $2,500,000. The company also has an authorized issue of $1,500,000 class B common stock, par $10 (none of which is outstanding). The additional class A stock is being offered at par ($10 a share). The proceeds, beyond satisfying relatively small current liabilities, will be used as working capital.

Company—Maintains general offices in Merced, Calif.; general sales offices in the Standard Oil Building, San Francisco, and divisional sales offices in Fresno, Bakersfield and Sacramento. Company owns in fee simple, a 145-acre mill site, 1½ miles from Merced, Calif., on which it has erected, and is operating, an advanced type of portland cement mill, with a capacity of 2,700 bbls. a day.

After having received 8% per annum since issuance, the class A participates to the extent of 30% in all dividends declared in any year to the holders of class B stock.

Bessemer Limestone and Cement Earnings

BESSEMER Limestone and Cement Co. reports for the nine months ended September 30, 1927, net profits of $360,679 after all charges, including interest and taxes, equal to $7.21 per share on the Class "A" stock.

Dolese and Shepard Paid $10 in Dividends in 1927

DOLESE AND SHEPARD CO.'S declaration of an extra dividend of $1.50 in addition to the usual quarterly dividend of $1.50 brings total declarations this year to $10 a share, instead of $8.50 as announced previously. Extras of $1.50 each were paid on January 1 and October 1, this year, and $1 extra on July 1.

Indiana Sand and Gravel Association Holds Annual Meeting

Indianapolis Gathering Reflects Optimism—Interesting Discussion on Many Technical and Economic Subjects

INDIANA sand and gravel producers have had a year of good business and this was reflected in the cheerful spirit and optimism that was felt in the thirteenth annual meeting of the Indiana Sand and Gravel Association, held in Indianapolis, November 29. There were no speakers from outside the membership, but there were some excellent discussions of topics ranging from the purely technical, such as storage and plant inspection, to economic subjects like absorbtion of freight rates and co-operation with the crushed stone industry.

Association Uses and Aims

E. Guy Sutton, who has been president of the association for three years, opened the meeting with an excellent talk on the uses of associations as he had found them in be in his long term of service. He admitted some of his opinions had changed in that time. The association, he said, had had to meet specific problems from year to year, car shortages, changes in freight rates and specifications, to name only a few of them, each seeming to be of the utmost importance at the time. But the final aim and end of every association ought to be to secure a reasonable profit for its members, he stated.

This does not mean that an association should try to get as much from and give as little as it can to the public, but quite the contrary. Industries are doing much for society today, improving products, conditions of work, and making efforts along purely altruistic lines. But such work is not possible until business is profitable. And the purpose of association should be, not selfishness, but the placing of the members in such a position as to allow them to carry on their business so the public can benefit.

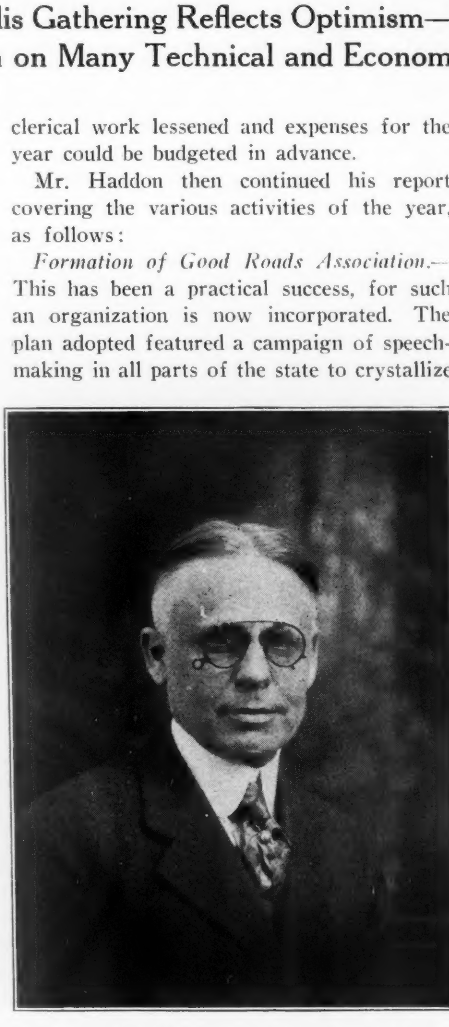
Finances and Secretary's Report

Jesse Shearer, retiring treasurer, read the financial report, which showed the condition of the association to be satisfactory, the debts it had incurred being steadily wiped out by the growing income.

Following this, Sam Haddon, executive secretary, told how dues were first placed at 0.2c per ton, then to 0.3c and finally to 0.5c, without providing sufficient income for the work undertaken. Then the subscription method was tried, each member being asked to make his subscription to correspond with his tonnage, and this had worked out well. Not only was more income secured, but clerical work lessened and expenses for the year could be budgeted in advance.

Mr. Haddon then continued his report covering the various activities of the year, as follows:

Formation of Good Roads Association.—This has been a practical success, for such an organization is now incorporated. The plan adopted featured a campaign of speech-making in all parts of the state to crystallize



George Nattkemper, elected president, Indiana Sand and Gravel Association

the sentiment for more rapid building of good roads before the next legislature met. For the first time in years people were showing dissatisfaction with the 17-year program and asking to have the roads built sooner. Mr. Haddon had attended meetings of the new association representing the sand and gravel association and aided in the work of organization.

Political Activity.—"All the world knows now that there was something seriously the matter with Indiana two or three years ago," he said, introducing the topic of the association's political activities. In his opinion, the present investigation and exposure of rotten political conditions in the state would never have been undertaken without the work of the Indiana Sand and Gravel Association, "the only organization that had the moral courage to stand up and swap punches with the gang," to use his words. Members could congratulate themselves, for the state had purged itself of the undesirable element in its political life. Relations with various public bodies were now on a basis of fair, square treatment on both sides, with perhaps one exception.

Plant Inspection

Plant Inspection.—It is hoped inspection of sand and gravel at the plant will be introduced everywhere in the coming year, with very good reasons for doing so. The only objection had come from some purchasing bodies which were afraid makers of such material as paint and steel might ask the same thing. Of course the case is much different with sand and gravel, as the freight forms so large a part of the delivered price.

Absorbtion of Freight Rates.—This Mr. Haddon defined as "taking money from another producer to give it to a railroad." He pointed out that the railroads themselves had followed out the principle of "absorbtion" until it brought them to the brink of ruin and the government had to step in and regulate them. Sand and gravel producers would do well to think this over.

In closing Mr. Haddon made several recommendations of local interest and one of general interest, namely, members should maintain good roads leading to their plants, not only for economical reasons but as a demonstration of their belief in good roads.

Topical Discussions

The afternoon session was given to short discussions of live subjects. The first being:

Inspection at the Plant.—In discussing this one member who shipped to points in Illinois and Indiana, said the business in Illinois was satisfactory because Illinois furnished plant inspectors. If Indiana did not his company would be forced to raise the price on shipments to Indiana points, for someone must pay for rejections, many of which, if not all, were not justified. The loss from unjust rejections had to be put up with because it was too costly to go out to the end of the line, perhaps, to argue the matter and make arrangements for reshipment. So the state would have to choose between paying more for material and furnishing inspectors at the plant.

The meeting agreed with the speaker and a committee was chosen to present the matter to the highway authorities to show them where it was to their advantage to install plant inspection from the saving of time and

fostering better relations with producers.

Storage Facilities Stabilize Prices.—An argument for installing storage facilities at the plant because of peculiar conditions in Indiana came up in discussing this subject. The state has an excess of sand and pea gravel, and some producers have given away the excess rather than take the trouble to store it. But there is a genuine demand for both materials and a fair price could be obtained for them if they were put in storage and only shipped out as orders were received for them. Practically all producers present agreed it would stabilize prices to put in storage facilities.

"Black Top" Roads a Market for Excess Pea Gravel

Gravel for "Black Top" Roads.—Last year Prevost Hubbard of the Asphalt Association spoke at the annual meeting of the Indiana Sand and Gravel Association on the use of gravel in "black top" roads. This year such use of gravel has been tried in several sections of county highways and has given excellent service. It was thought this use would greatly increase, and would furnish a market for the excess pea gravel and sand.

Some members objected, stating they believed it was wasting the people's money to build such a cheap type of road. But others pointed out these roads would be built by the counties anyway. There are 75,000 miles of road in the state and only 5000 are in the state highway system. The people who live off the paved roads are demanding roads free from dust and mud, and they will build the black top road where they cannot afford a better type. As one member put it, "It is like a man who buys a $4 pair of shoes when he knows a $6 pair will be worth more than the difference—but he has only $4." The black top was said to be widely used for resurfacing old roads.

Ready Mixed Concrete Plants.—This topic did not arouse any enthusiasm or create much discussion. Most of the producers present ship all their production by rail in carload lots.

Wayside Pit Competition

Wayside pit competition proved one of the most interesting discussions of the session, as one of the producers who had been in the wayside pit business gave his experience with it. He said it was a hard game. It is hazardous, it takes continual testing of the deposit and the product, and it is hard to finance. In spite of opinion to the contrary, inspection of wayside pit material is more severe than that given to the product of an established plant with a reputation to maintain. He had made good money on two jobs but lost on others and was now a regular producer of washed material.

A typical instance of the hardships attending wayside production was of a contractor who took over a deposit a regular producer had turned down. About $10,000 was invested in a temporary plant which had to be abandoned after producing about 200 yd.

Another instance was that of a contractor who loaded trucks from a wayside pit and then covered them with enough material from a good plant to permit them to pass a careless inspector. The road failed and the contractor now has a suit for $100,000 on his hands.

Absorbtion of Freight Rates

Although it was not a regular topic on the program, there was some lively discussion about the absorption of freight rates. George Nattkemper, the newly elected president, warned the members not to sell the material in their deposits at no profit because there were not many new deposits to be opened. He and Mr. Stuart hunted two years for a new deposit without finding one they wanted to work. If the ground was good the market conditions were poor and if the market conditions were good all the workable ground was taken up. Finally they found a deposit, but they would not know where to look for another.

Absorption of freight rate usually means selling production at no profit if not at a loss. It is not only poor business, it is an economic loss to the community to deplete a natural resource without adequate return.

Co-operation with the Crushed Stone Industry

A somewhat delicate topic was "Co-operation With Crushed Stone Producers," and the discussion tended to flow around it. However, the members seemed to be in a receptive mood and willing to consider the matter further. A great deal of interest was shown in a report by Mr. Haddon on how he found a combination association (the Wisconsin Mineral Aggregate Association) working in a nearby state. The meeting took no action but the sentiment was prevalent that further information would be welcomed.

New Officers and Directors

An entirely new set of officers and directors was chosen, the old officers feeling they had done their part and it would be better for the association to have other men acquainted with the responsibilities and problems of association work. Those chosen were:

President, George Nattkemper, Terre Haute Gravel Co., Terre Haute; vice-president, Earl Baker, Baker Gravel Co., Noblesville; secretary-treasurer, George V. Miller, Granite Sand and Gravel Co., Indianapolis.

The three directors chosen were: Lee Whitty, Wabash Sand and Gravel Co., Terre Haute; K. R. Misner, West Indiana Gravel Co., Lafayette; Charles Purdum, Sturm and Dillard Co., Syracuse.

The new officers were unanimously elected and assumed their offices at noon, the afternoon session being in charge of President Nattkemper.

The annual banquet was held at the Claypool hotel in the evening.

Sand and Gravel Convention Exhibit Space All Sold

THE National Sand and Gravel Association seems to have established a record in connection with the exhibit of its Manufacturing Division at the coming convention (January 4, 5 and 6) in Detroit, Mich. For on December 1, more than a month before the opening of the convention, Secretary V. P. Ahearn announces that all the space available has been sold out. Herewith is a complete list of exhibitors and the space assigned to them:

Company	Booth Numbers
The Allen Cone Co.	60
Allis-Chalmers Manufacturing Co.	12
American Manganese Steel Co.	51-62
Bakstad Crusher and Equipment Corp.	7
W. H. K. Bennett Co.	2
Blaw-Knox Co.	16-17
Brookville Locomotive Co.	71
Bucyrus Co.	2
Cement Mill and Quarry	22
Chain Belt Co.	52-53
The Cincinnati Rubber Mfg. Co.	42
Cross Engineering Co.	50
The Dorr Co.	64
The Dravo Contracting Co.	23-24
Eagle Iron Works	47
Easton Car and Construction Co.	23
Fairbanks-Morse and Co.	20-21
Farrell-Cheek Steel Foundry Co.	49
The Fate-Root-Heath Co.	29
General Electric Co.	31
Hardinge Co.	55
Harnischfeger Sales Corp.	69-70
The Hayward Co.	8-9
The Heil Co.	27
Hendrick Manufacturing Co.	56
C. W. Hunt Co.	15
Industrial Brownhoist Corp.	37
The Jeffrey Manufacturing Co.	33
Koppel Industrial Car and Equipment Co.	19
A. Leschen and Sons Rope Co.	39
Link-Belt Co.	3-4
Manganese Steel Forge Co.	35
The Marion Steam Shovel Co.	25-26
Mead-Morrison Manufacturing Co.	5-6
Morris Machine Works	18
The New Jersey Wire Cloth Co.	48-65
Niagara Concrete Mixer Co.	45-46-47-48
The Osgood Co.	32
Pit and Quarry	38
Roberts and Schaefer Co.	54-59
ROCK PRODUCTS	34
Sauerman Bros.	43-44
Smith Engineering Works	11
Stephens-Adamson Manufacturing Co.	57-58
Symons Bros. Co.	63
Taylor-Wharton Iron and Steel Co.	10
The Thew Shovel Co.	28
The W. S. Tyler Co.	40-41
Universal Crusher Co.	13
Vulcan Iron Works	14
The F. M. Welch Engineering Service	61
Western Wheeled Scraper Co.	66
G. H. Williams Co.	30

Lyman A. Reed

LYMAN A. REED, 67, the secretary-treasurer of the Diamond Portland Cement Co. of Cleveland, Ohio, died recently at his home in Lakewood, Ohio. Mr. Reed was well-known in Cleveland, having been a director of the City Savings and Loan Co. for years.

Missouri Valley Aggregate Industry Aided by Engineering Service

Reports and Discussions at Annual Meeting of Missouri Valley Association of Sand and Gravel Producers Prove Efficacy of Scientific Methods of Promotion

FEATURES of especial interest marked this year's meeting of the Missouri Valley Association of Sand and Gravel Producers, held at Kansas City, December 5 and 6. One was the discussion of the comparatively new materials, sand-gravel for concrete and road sand. Another was the report of the first year's work of the engineering department of the association. A third was the reception of a member representing the largest producer of crushed stone in the district and his report on conditions in the stone business.

District reports showed that the sand business had been about the same as in former years. One district reported a slight increase, the others that business was about the same or a little less. It seemed quite clear, however, that business would have been a good deal worse, had it not been for the promotional work of the engineering department and the association as a whole, and also for the increased tonnage due to the production and sale of the new materials mentioned.

This was brought out in the opening address made by the president, N. C. Dunn, whose speech also contained a number of local bits that put the members in a pleasant frame of mind. Seriously, two points that he made were the need of studying sand-gravel production and the establishment of some sort of a manufacturing industry that would take up some of the excess production of sand.

The report of Otto Kuehne, Jr., the secretary-treasurer, showed the association in good financial shape, with sufficient dues to cover the extra work undertaken. E. E. Sholer, the association's engineer, made a detailed report of the expense incurred by his department and told something of his plans for the coming year. John Prince suggested that a budget committee consider the proposed expenditures to decide not only on a program but on the advisability of increasing dues to carry it out. Later this committee reported that the budget prepared by Mr. Sholer had been accepted by them and that the present dues would provide sufficient money to cover the cost of all proposed activities.

Report by Districts

OKLAHOMA. W. A. Rogers, reporting for the Oklahoma district, said that continued dullness had prevailed in the sand business, due principally to the depression of the oil business. Operating costs had been very high on account of high water, one flood following another throughout the season. No new plants had been built, but some shifts in shipping conditions brought new competition into the district.

Road work had not provided a satisfactory market owing to political conditions. The road commission was all right but it was badly hampered by politicians. There was a well founded hope that this condition would be improved in 1928. One trouble with highway business had been that inspections had been unusually severe for both rock and sand, and many cars had been rejected that at other times would have passed without a question. Eighteen cars of rock were turned down in one shipment. So far as sand is concerned the price of 50c a ton is altogether too low if the rigid specifications adopted have to be strictly adhered to.

UPPER KAW—O. W. Knight, reporting for the Upper Kaw River district, said business was a little less than in 1926. Some new plants had begun producing and competition was keen, although the price had remained about the same through the year.

The production of sand-gravel was increasing the total tonnage, but there was no money in it where it had to be sold at a sand price. To make it, 75% of what was pumped from the river had to be discarded. "We are either getting too much for sand or altogether too little for sand-gravel," was the way he put it. His suggestion was a sliding scale of prices for material based on the coarseness of the material, or its fineness modulus.

LOWER KAW—John Prince in reporting for the Lower Kaw district, approved Mr. Knight's suggestion. He said it was foolish for the members not to realize how little there was of this sand-gravel material in the river. The engineers wanted sand-gravel with a fineness modulus of 4.00 and producers were asked to furnish it at the same price as sand with a fineness modulus of 2.70. Tests on the run of river material showed that there was less than half as much material having a fineness modulus of 4.00 as there was of material having a fineness modulus of 2.70.

As to business, he estimated that it had fallen off 20% as compared with 1926. This was due to many causes, a principal one being that state highway work was only 25 to 30% of what it had been. Building permits in Kansas City were about 40% below normal. Street paving had been fairly good and this had especially helped the crushed stone producers. He did not see much chance of improved business in 1928 and would be satisfied if there was a 10% increase.

New plants had been established and competition was keen and the average price received had been lower than in former years. He hoped the association would follow up the work with the railroads, showing them where it was neither to their interest nor to the interest of the public to have more unprofitable plants. The railroads could do a good deal to prevent the establishing of more plants if they would. It is true the law compels them to put in a switch but it does not compel them to lease their own ground to intending producers and otherwise smooth the way for them to go into business.

MISSOURI RIVER—Captain R. J. Stewart reported for the Missouri River district and said that all producers had done a little more business than they had last year. The price had been fairly stable. Competition had been pretty strong, but one plant had gone out of business. The outlook for 1928 was for about the same business as in 1927. Of course, if the proposed road bond issue in Missouri is adopted it will make business good for everyone. The outlook for general construction is only fair, but it is good for additional street paving.

Captain Stewart agreed with previous speakers about the folly of producing special materials to sell at the same price as ordinary materials. In his case, it cost 15c to 20c more to produce a ton of sand for state highway work than it did to produce a ton of ordinary building sand, but he had to sell both at the same price.

The producers in his district had co-operated with the county authorities in building sand roads, and the experiment had been so successful that the county authorities were now buying road sand to go on with the work. He thought that sand roads would be used to a considerable extent in country districts and in small towns which could not afford paved highways. For the first experimental road the producers gave the sand

which was put down in four applications, a layer about ½-in. thick for each application.

ARKANSAS RIVER—F. H. Gaedes reported for the Arkansas River district, in which he said business was below normal but it had been helped by a vigorous promotion of road sand. There was plenty of business in Wichita, but new plants had come in and the price had been cut to where there was a loss or no profit in sales so his company (the largest in the district) had kept out of it.

Regarding sand-gravel either for road or concrete purposes, he agreed that it was wrong to sell it for the same price as sand, but he pointed out that it might profitably be sold at a lower price than that indicated by the proportion of sand that had to be discarded as the increased volume of production would lower costs all the way through. In his opinion competition with crushed rock was the deciding factor. For use in concrete, he thought the price should be according to the mix permitted by the specifications, sand-gravel for a 1:3 mix being obviously worth less than sand-gravel for a 1:4 mix. John Prince, commenting on this, said that road sand-gravel (or road sand) and sand-gravel for concrete should not be confused. There was little chance of selling sand-gravel for concrete in localities where crushed stone could be easily obtained as it could be in most of the territory covered by the association.

What Sand-Gravel and Road Sand Are

The association's engineer furnished Rock Products with the Kansas specifications for road sand and sand-gravel aggregate which are as follows:

ROAD SAND

Passing 1-in. square opening	100%
Retained on ¾-in. square opening, not more than	4%
Retained on 4 mesh, not more than	30%
Retained on 14 mesh, not more than	35%
Retained on 28 mesh, not less than	80%
Passing 100 mesh, not more than	3%

Certain limits, not to be exceeded, are set by another part of the specification and a formula is given for finding how much shall be paid for sand that does not quite meet the specification.

SAND-GRAVEL FOR HIGHWAY CONCRETE

Fineness modulus	Mix	Minimum cement	Average cement
3.15 to 3.60	1:3.00	1.90	1.95
3.61 to 4.10	1:3.40	1.80	1.85
4.11 to 4.35	1:3.75	1.65	1.70

Not more than 30% shall be retained on 4-mesh and at least 15% shall pass 28-mesh. The silt content shall not exceed 2%.

Crushed Stone Business Good

William Bugg, a new member representing the Consumers Materials Corp., said that stone producers had had a pretty fair year, with business especially good since May 1. His company was trying to improve trade practices and was introducing the sale of stone by weight. They had found out that unscrupulous competitors would bid low on a job and then try to make up the loss by giving short measure. This could not be done where every load was weighed and recorded.

There had been no trouble with state inspection as all state highway stone was clean stone from underground workings. The only thing to be watched was the grading.

Much of the stone sold for street paving had been sold in ready mixed concrete, and conditions were such that this way of selling was satisfactory. Prospects for 1928 appeared to be very good, especially for street work.

Engineering Activities

The first afternoon session was devoted to the engineer's report and its discussion. Mr. Sholer said that as the work was new some time had to be spent in organizing it, but a great deal of importance had been accomplished.

The purpose of the engineering work was to acquaint both producers and consumers with the uses of the product and to increase the public's knowledge of aggregate and its production.

Some of the things that had been done were to publish pamphlets, to hold public meetings and get the reports of them in the newspapers, to form contacts with engineers and other associations, to call on state, municipal and county authorities and present producers' cases, and to assist in solving problems of individual producers, both as to production and sales.

Two pamphlets for distribution to contractors and engineers had been published, "The Advantage of Natural Sand as Fine Aggregate for Concrete," and "The Importance of Clean, Sound, Well Graded Aggregate in Concrete." Literature from the national associations had also been distributed. It was planned to prepare and publish other pamphlets during the year on bulking, grading, workability, effects of temperature and moisture on concrete and like subjects.

Tests on sand and other material were now being made at the Manhattan laboratory of the University of Kansas to determine durability and soundness. The association was co-operating in this and would pay half the expense.

Mr. Sholer was strongly in favor of laboratories for the National Associations so that tests of this kind could be made. The expense would be less and it would be better to give the money to a laboratory of the industry than to one outside the industry.

He has begun an investigation of deteriorating concrete in the district of the association and while a report cannot be made as yet, several photographs have been collected and enough data secured so that the course of disintegration can be ascertained. These photographs have been made into lantern slides which were shown the members. The subjects were highway slabs, culverts and bridge piers and the causes of disintegration were found to be front action on unsound aggregates, dirty aggregates, improper placing of reinforcing, lack of expansion joints and too porous concrete. Some of the concrete had the proper water ratio for high strength and cylinders taken from the mixer were broken to prove that the concrete had the strength, but the concrete disintegrated in three or four years because of unsound aggregates or other causes having nothing to do with the design of the mix.

Association Subscribes to National Laboratory Fund

The morning session, December 6, was given almost wholly to a paper by Stanton Walker, director of the engineering and research division of the National Sand and Gravel Association. In this he reviewed the research results of various bodies and gave the technical status of various sand and gravel products. He showed the need of further research along several lines and explained why the National Sand and Gravel Association needed a laboratory to further the work. His argument was so convincing that the association at the end of his talk voted an increase of dues for a subscription to the National Association laboratory.

Mr. Walker introduced his subject, "The Relation of Research and Promotion to the Sand and Gravel Industry," by the statement that research and promotion went hand in hand. Few of us realize how widespread is the use of sand and gravel. There is hardly an industry which does not use one or both of these products at some time and in some way. Research is needed for practically all uses.

The principal use is in concrete, and while research in concrete has been extensive the ground is by no means covered. We need to know more of cleanliness, grading, durability and other characteristics of aggregates. What has been learned is important but what has yet to be learned is still more important. We might make a long catalog of the facts we know about aggregates, and about the uses of sand and gravel in general, but we could make a still longer catalog of the things we do not know and would like to know.

Some of the uses mentioned by the speaker were, as aggregate in bituminous paving, as plastering sand, as foundry sand, as glass sand, as filter sand, and as refractories. A brief statement of present specifications for each use was given and it was developed that all specifications were tentative and that research might change any of them, admitting materials that are rejected today. Our present policy is to play safe, and to do this "we must put up with the lack of economy that goes hand in hand with ignorance."

He showed how much the sand and gravel industry was indebted to other organizations, notably the Portland Cement Association, for its knowledge of its own products. Many things had been started in this work which the sand and gravel industry should follow up in justice to its products.

For lack of accurate information sales are

being lost. He gave some instances of this, in which it was shown that if the producer had had accurate information concerning the uses of his product he could have convinced the engineer in charge of a job that certain specification requirements were unnecessary. The same accurate information would obviate such absurd situations as arise from widely differing specifications in adjoining states both of which buy sand and gravel from the same deposits.

After explaining why a laboratory was needed, Mr. Walker said that the board of directors of the National Association had approved the idea and had estimated that a tax of one-half mill per ton for the first year and one-quarter mill for the second year would meet the necessary expense. At present, subscriptions were being received from individual producers, and some members of the Missouri Valley association had made individual subscriptions.

As the Missouri Valley association is one of the two associations that pays a group subscription to the National Association, some of the members seemed to think the association should contribute as a group to the National Association's laboratory. A motion to increase dues by one-half mill per ton for that purpose was carried without opposition.

New Officers and Directors

The following nominations were brought in by the nominating committee and declared elected by a unanimous vote:

President, H. E. West, West Sand and Gravel Co., Muskogee, Okla.; vice-president, Otto Kuehne, Topeka Sand and Gravel Co., Topeka, Kansas; secretary-treasurer, John Prince, Stewart Sand Co., Kansas City, Mo.

Directors from the five districts: Missouri River, R. J. Stewart, Pioneer Sand Co., St. Joseph, Mo.; Oklahoma, G. E. Williamson, Tulsa Sand Co., Tulsa, Okla.; Arkansas River, F. H. Gaedes, Consumers Sand Co., Topeka, Kansas; Upper Kaw River, O. W. Knight, River Sand Co., Topeka, Kansas; Lower Kaw River, Frank W. Peck, Muncie Sand Co., Kansas City, Mo.

The Kansas City producers entertained the members and their families at a theatre party Monday night and at an informal dinner Tuesday night.

Rockwood-Alabama Company Bought by Geo. A. Fuller Co.

THE Rockwood-Alabama Stone Co., located at Russellville, 20 miles south of Sheffield, Ala., has been sold to the George A. Fuller Co. of New York for $450,000, according to the announcement of A. D. Creighton, president and general manager of the stone company. The stockholders of the company were Nashville men, and the business had been operated for the past 20 years.

The property embraces 1500 acres of limestone land and two large quarries, the deposits of oolitic limestone being among the best in the United States. According to the plans of the new company, the production will be increased to 1,000,000 cu. ft. of finished stone annually and an average of five carloads daily will be shipped. This would approximately quadruple the former output, it is said.

Officers of the Rockwood-Alabama Stone Co. were: W. F. Creighton, president; J. S. Dunbar, Jr., vice-president; W. F. Creighton, secretary-treasurer, and M. F. Sills, assistant treasurer, all of Nashville.

Officials of the new company are: J. S. Manning, president; C. A. Perry, vice-president and general manager; Albert Mau, secretary-treasurer, all of New York, and Grady Farley, assistant treasurer, Russellville, Ala.

New Sand Company Planned Near Arkadelphia, Ark.

A. D. MASON of El Dorado, Ark., is reported to be negotiating for a site and a permit to build a gravel plant on the west bank of the Ouachita river, half a mile below Arkadelphia, Ark.

Between $25,000 and $30,000 will be spent on the plant and the gravel will be taken from the bed of the stream under a permit from the state. As the gravel bed lies near the east side of the stream, the company will build a tower on the bank and construct a cable across the stream on which cars will run to the west side, where the screening and washing will be done. The plant will be put up on property owned by Graham Brown, and the east side tower on ground owned by T. A. Sloan.—*Little Rock* (Ark.) *Gazette.*

Georgia Lime Rock Co. to Build Crushing Plant

THE Georgia Lime Rock Co., Perry, Ga., operated by the Dixie Products Co., Columbus, Ga., has acquired about 300 acres in Houston county, Georgia, in the vicinity of Perry, and is planning the establishment of a plant for quarrying and crushing lime rock. It is planned to provide facilities for a capacity of about 35 to 40 cars per day. The new plant will cost more than $45,000 and is expected to be ready for service in about 60 days. The work of clearing the ground for the new crusher is now underway, and some of the plant machinery has already been received.

Huron Portland Plans Packing Plant at Buffalo

PLANS have been completed by the Huron Portland Cement Co. of Detroit, Mich., for a packing plant at the company's property on the Hamburg Turnpike, in Buffalo, N. Y. The structure will be of one story and will cost approximately $140,000.

Ste. Genevieve Quarrymen's Union Asks Shorter Hours

PROBABLY one of the first unions in the quarry industry is the Quarrymen's Union of Ste. Genevieve, Mo., which was recently organized. The members of the new union are employed in the lime plants in the vicinity of Ste. Genevieve. The organization has made demands upon the operators of the four major companies of the district asking for shorter hours, and the outcome of the controversy will affect approximately 500 men employed in the Ste. Genevieve plants. The new union is affiliated with the American Federation of Labor.—*Jackson* (Mo.) *Cash Book.*

R. T. Haslam, Fuels Expert, Resigns from Boston Tech

ROBERT T. HASLAM, of the department of chemical engineering, has resigned from the faculty of the Massachusetts Institute of Technology, effective November 1.

For some time past, Prof. Haslam has acted as a technical consultant and adviser on research and development projects for the Standard Oil Co. (New Jersey) and its affiliated companies, giving to this work an increasing proportion of his time. He will continue his connection with the Institute as non-resident professor of fuel and gas engineering, but will devote practically his entire time to development work relating to the oil industry as a member of the executive staff of the Standard Oil Development Co. at 26 Broadway, New York City.

Prof. Haslam is best known to the rock products industries through his contributions on the burning of lime. For a number of years the National Lime Association research fellowship at the Massachusetts Institute of Technology was under his supervision and direction, and much of the published data ensuing from this source had a pronounced effect on the entire industry. The volume, "Fuels and Their Combustion," brought out in collaboration with Prof. R. P. Russell, is one of the authoritative books on this all-important subject.

Announce Speakers for Crushed Stone Convention Banquet

THE banquet speakers for the 1928 West Baden, Ind., convention of the National Crushed Stone Association are announced as follows: A. J. Brosseau, president, Mack Trucks, Inc., and chairman of the highways committee, National Automobile Chamber of Commerce, Inc.; Norman Hapgood, journalist and ex-minister to Denmark; Harold Van Orman, lieutenant governor of Indiana, and Maurice Holland, director, division of engineering and industrial research, National Research Council.

The banquet will be held on the evening of January 19, the last day of the convention.

Wisconsin Aggregate Association's Meeting Like a National Convention

Machinery Men Have Important Part in Program

WISCONSIN producers can afford to celebrate this year, for they had more business than last year by about 14%, according to the records of the association. The price has been none too good, and they have not had their full share of the state highway business, most of the increase in highway material production being credited to the wayside pit and occasional producer. Despite these handicaps, however, it seemed to be the general opinion that the industry had received enough to pay all costs of operation and have something left over to pay a return on invested capital.

Cost Accounting

The first paper presented, aroused quite as much interest as any, as it was on a subject close to the thought of every producer present, "Cost Accounting and Its Application to the Mineral Aggregate Industry." Its author was Col. Carl Penner, who is auditor for the association and who assisted in drawing up the accounting system used by the members.

Colonel Penner said that all trade associations had found it important to assist members in cost accounting. In some instances they had carried the idea of a uniform cost accounting too far, as they had made it a basis for fixing prices, whereby some individuals had found themselves in state and federal courts charged with conspiracy. But the purpose of cost accounting is not to fix prices. It is to allow those who use it to determine the price at which selling is profitable. He had to admit that it often does raise prices, as those who use it find out for the first time what the cost of production really is. The idea of using uniform cost-accounting is not to eliminate competition, but to eliminate blind and ignorant competition, which benefits no one. And the only way for this to be done is for every individual producer to know just what his costs are.

Colonel Penner took the case of a company starting in the sand and gravel business to show how estimates of the costs of production and distribution might be made. The price of the product would have to be taken as a fixed quantity, in such a competitive material. The company would not be justified in going into the business unless there could be shown a sufficient margin between estimated cost and the market price to justify the investment.

After the business was established proper cost accounting would show not only that the business was profitable or unprofitable, but why. A mere record of transactions could not do this. For example, it might be guessed that the business had been unprofitable because it was too small in volume, but if lack of volume was not the real reason increasing the volume of business would only increase the losses. So the accounting, to be worth anything, must be in such shape that the figures can be analyzed.

For aggregate production, Colonel Penner favored a simple cost accounting system which the plant bookkeeper could attend to without unduly increasing his work. It required a little statistical work in the way of production records, but the remainder of the figures could be taken from the regular books of account.

He put costs under the headings "Production" and Distribution" and made "Stripping" a separate department under production, one reason for this being that it created an asset in stripped ground which might be inventoried as such. "Distribution" in the case of a railroad plant was a simple matter, but it was anything but simple for a plant making truck deliveries. He advised the keeping of truck records in detail, even to keeping records of individual trucks, so that comparisons could be made.

He thought that the same cost per ton should be given to all products of a sand and gravel or crushed stone plant since all products go thought about the same process. But if any special sizes or products were made, the extra expense involved should be determined and charged to the product.

In closing he asked his hearers to remember that securing uniformity in accounting methods is a proper and valuable association activity, and that only a slight amount of additional work is required to keep cost accounts along with the regular plant bookkeeping.

Several questions were asked Colonel Penner at the close of his paper. An important one was: Should the cost per ton be based on the tonnage produced or the tonnage sold? He answered that this depended on how the inventory of stock was handled, but in most cases it was preferable to base it on the tonnage produced.

Belt Conveyor Operation

"Belt Conveyor Operation" was the subject of a paper by W. E. Phillips of the Link-Belt Co., Chicago. Mr. Phillips gave an excellent paper last year on recent improvements in conveying machinery. This year he discussed conveying as a system of transportation, showing its vital importance in plant operation, especially in reducing costs. Recent installations of belt conveyors are carrying sand and gravel as far as two miles and coal as far as five miles.

As to operation, Mr. Phillips said that each installation was a separate problem to be considered individually. But some of the limits fixed by experience were: speeds of 16-in. belts and narrower may be as much as 300 ft. per minute; speeds for 24-in. belt may be 400 ft. per minute, and for 36-in. belts they may be 600 ft. per minute. In some cases extraordinary speeds have been used successfully, one belt handling sand and gravel at 750 ft. per minute for about 1100 ft. It is better to run a belt full and run it slowly than to run it partly full and fast, as the wear on the belt is less.

A recent very successful development is the handling of wet concrete by belts instead of by chutes, or by buggies. The concrete for belt conveying can be mixed with a lower water-cement ratio and hence money can be saved in cement. He instanced one very large construction job in Canada in which $60,000 was saved in cement alone by using belts in the place of chutes.

In the discussion that followed, Mr. Phillips was asked how large pieces could be carried by belts of ordinary widths. Mr. Phillips said that pieces up to 12-in. presented no difficulties if the inclination of the belt did not exceed 17 deg. He was asked if the big pieces would not cause the belt to sag between the idlers, and said that they would not if the idlers were properly spaced, according to the tension given the belt. For heavy duty belts of six and eight plies were used and idlers spaced at 2 ft. 6 in.

Asked about field conveyors, he said their use was increasing and they were very satisfactory under the proper conditions. A face at least 500 ft. long was wanted. He gave as an instance a gravel pit which had a face only 15 ft. high, but which was 500 ft. long, worked by a steam shovel. The belt was on skids and it had to be moved every two days. After the plant force understood how to handle it, the belt could be skidded over to the bank and lined up in a very short time.

Asked about belts on pontoon bridges,

Mr. Phillips said that they were successfully in use, as were belts on suspension bridges. It is quite feasible to use a belt on a pontoon bridge to convey material from a dredge to a washing plant on shore. Ordinary winds and wave action do not affect the working of the belt.

As examples of long belts he spoke of one 48-in. belt of 2400-ft. centers and one 36-in. belt of 1500-ft. centers. This is handling sand and gravel.

Car Loading Methods and Problems

J. C. Buckbee, consulting engineer, of Chicago, was unable to be present, so the short paper he had prepared on car loading was read by his associate, Gordon Smith. The paper confined itself to the most difficult problem of car loading, that of preventing segregation, in loading mixed sizes.

The paper said that segregation was least where the product was made into a number of sizes and each size put in a bin of comparatively small area, which prevented segregation in the bin to some extent. As bins are filled the tendency is for the fines to remain in the center and for the coarse to roll to the outside. In discharging a bin of segregated material it is better to load the car in layers, but even this does not wholly remedy the segregation.

The method of loading has to be governed somewhat by the method of unloading. The method of unloading which mixes the material best is that of a hopper-bottom car that dumps its contents in a mass. Such a car loaded in layers will discharge a fairly uniform mass.

One of the things we need is a rising and falling conveyor so that it can be set to put the material in a car without too much drop. This will be better for the material and it will make less segregation.

At the conclusion of the paper, Mr. Smith showed a number of lantern slides illustrating crushed stone and sand and gravel plants which had been built by the J. C. Buckbee Co. As these are among the more important plants in the United States and Canada, the pictures were received with a great deal of interest. In some of them were shown a very complete arrangement for loading mixtures of aggregates with very little segregation. This consisted of a belt under a series of bins, each bin having a feeder which could be set to deliver a determined amount. All the feeders were operated by a connecting reach rod. The amount fed (from nothing to the full capacity of the feeder) was regulated by a handscrew. The stroke of the feeder was also adjustable.

Dorr Washers and Classifiers

As Dorr washers and classifiers are not so well known in the sand, gravel and crushed stone industries as they should be, the association invited W. B. Gery, of the Dorr Co., New York, to describe the four principal machines used in these industries and to show their application.

Mr. Gery said that all but one of these machines had been developed from the original Dorr classifier, which is an inclined trough with a pair of rakes that draw out settled sand. This is a two-product machine which can make any separation between 28-mesh and 80-mesh, the rake product (coarse) being washed and dewatered. If another product is wanted, a second classifier is installed to separate sand from the overflow. He gave as an example the Lehigh Sand and Gravel Co.'s plant at White Haven, Penn., which has two classifiers in series. The first separates on 48-mesh, and the rake product is a very good concrete sand. From the overflow a plastering and mason's sand is separated by the second classifier. This installation has run about three years with practically no repairs.

The bowl classifier was a development of the machine described, adapted to handle fine material. It has a flat tank or "bowl" over the rakes with an area large enough to settle the finest sand wanted in the rake product. This bowl has sweeps moving on the bottom that draw the settled sand to a center opening where it falls to the rakes and is drawn out as in the original Dorr classifier. The use of the bowl of large area is necessary because a high degree of dilution is necessary in separating fine materials. Sometimes a dilution of 10 to 1 has to be employed to give the grains freedom of movement. Separations on 250-mesh and 300-mesh ma ybe made with this machine.

The Michigan Silica Co. uses a bowl classifier to collect and wash silica sand which is 28-mesh and finer. The capacity is 50 tons per hour. Dolomite, Inc., has such a machine in its crushed stone plant at Maple Grove, Ohio, which is washing limestone ¼-in. and finer, the rake product being agricultural limestone. The overflow, which is settled in sludge basins, is also saleable.

The Dorr washer is a machine which will handle everything from 6-in. diameter down to 80-mesh. Its especial field is washing material that contains a great deal of clay. It consists of a washing barrel, or revolving screen of perforated metal, placed transversely to a Dorr classifier. The barrel is run partly submerged and is provided with filters which turn the material and cause it to cascade in the barrel. An internal scoop removes everything that does not pass through the perforations and delivers it in a dewatered condition.

Perforations of 5/16-in. diameter are generally used for the barrel. The design and the method of circulating the water used prevents the perforations from blinding.

An especially interesting installation of this machine is to be found at the plant of the Western Indiana Sand and Gravel Co. at Metropolis, Ind. The feed is dredged by a 10-in. pump and the pump discharge is partially dewatered in a tipple before it goes to the washer. About 1000 g.p.m. of water is used with the output of 150 tons of washed sand and gravel per hour, the remaining water from the pump discharge being turned to waste. Some fresh water is used in the rinsing sprays.

Before this machine was put in, cars had been rejected on account of too high a clay and silt content, but there have been no such rejections since. The work was so satisfactory that the company decided to cease stripping the ground and to pump the 6-ft. of overburden along with the sand and gravel. They have been able to make just as clean a product while doing this.

Another noteworthy installation of this machine is at the plant of the Quinn Stone and Ore Co. at Fort William, Ont. It is washing trap rock, removing a great deal of clay and mud which comes from seams in the ledge. It makes a product from 3-in. to ¼-in. and a product from ¼-in. to 80-mesh, with an overflow that is sent to waste. The stone has to be very clean, as it is used for making trickling filters as well as for aggregate. The output is 150 tons per hour.

The Dorrco sand washer is a simple machine, used where the sand needs only a simple washing and dewatering. It will make a separation on 65-mesh and finer meshes. The usual output is from 125 to 175 tons per hour of washed sand. It is used on dredges as well as in land plants.

This machine consists of a tank 12 ft. in diameter with an inclined false bottom over which a wheel moves carrying buckets or scoops on its periphery. These throw out the settled sand in a dewatered condition. The overflow is sent to waste.

This machine is used in a number of sand and gravel plants, among them being the plant of the Arundel Corp. near Baltimore, Md. It is also used on the dredge *Magic City* at Miami, Fla. A full description was published in Rock Products, December 11, 1926, issue.

Relation Between Producer and Carrier

The first paper of the morning session of December 8 was on the "Relation Between Producer and Carrier," and it was read by J. L. Brown, superintendent of transportation of the Chicago, Milwaukee & St. Paul railroad. Mr. Brown prefaced his paper by a short speech to the association thanking the members for co-operation, especially in furnishing estimates of shipments so that cars could be furnished in time.

Very good relations exist between mineral aggregate producers and carriers today, the carriers doing their best to furnish service and the shippers co-operating with prompt loading and unloading and filling cars to capacity.

He analyzed the things that enabled a railroad to furnish cars promptly, showing that this does not depend on owning a great many cars so much as on prompt loading,

adequate yard facilities and passing facilities, motive power and, above all, the co-operation of employes.

Shipments of sand, gravel and stone in the past year over the Milwaukee were 5,250,000 tons, or about 10% of the total tonnage handled.

Comparative loadings of sand and gravel were as follows:

Year	Number of Cars Loaded	Average Load Tons
1923	79,489	49.5
1924	75,461	50.8
1925	85,719	51.1
1926	89,157	51.4

Commenting on these figures, he called attention to the increase in the average load from 49.5 tons in 1923 to 51.4 tons in 1926. If the 1926 cars had been loaded to the 1923 average weight, about 92,000 cars would have been required.

He gave some figures showing the valley and peak of seasonal loadings and said this was one of the real problems of the carriers, especially as the curve of coal shipments begins to rise about the time sand, gravel and stone shipments are at their peak.

Concluding, he said that a survey had shown the battleship type of hopper-bottom car was best adapted to the needs of the district, and his company was preparing to buy more of them. He wanted to know the opinion of the members as to this and it was arranged that the association would make its own survey as to the type of equipment most needed and communicate with him.

Aggregate Producers' Problems

"Some Problems of the Mineral Aggregate Producers," was the topic discussed by Stanton Walker, director of engineering and research of the National Sand and Gravel Association. Passing over the ordinary problems of production and sales, Mr. Walker spoke especially on problems of national importance.

The chief of these is to educate the user of sand and gravel, and this education should be along two lines. The first is to teach him that stone, sand and gravel are really manufactured products, quarrying and excavating being merely preliminary steps to manufacturing. He must also understand that the producer has a large invested capital engaged in a highly competitive business where the returns on the invested capital are only reasonable.

The second line education must take is that of teaching the proper uses of the product. It must be shown that concrete is no better than the aggregate of which it is made. It may be worse but it cannot be better. This not only informs the user of aggregate of its importance, but it shows the heavy responsibility resting on the producer to furnish only dependable aggregates.

Some producers say it is up to the consumer and his engineer to say what is wanted in concrete aggregate, and the producer need do no more than furnish what is called for. But this is avoiding a proper responsibility and such a system actually harms the producer. Without accurate information he will not be able to tell the buyer where he is wrong in asking for material that cannot be properly used or cannot be readily produced. Haphazard materials do not go in scientifically designed concrete, and it is to the consumer's own interest to use properly prepared materials. In one instance, the saving in cement from using properly prepared materials was $1.50 per yd.

The first essential of a properly prepared aggregate is cleanliness, for if we do not have clean aggregate we may not get concrete at all, after we have made the mix. But grading and uniformity are almost as important, for the mix cannot be changed every time a shipment of aggregate is received, as it would have to be if the grading were not uniform.

Possibly the greatest need at the present time is accurate information for specifications. When we get it we will not have such absurdities as the specifications confronting one consumer who has to meet specifications of a city, several counties and two states, and no two of these specifications are alike. Many producers have to meet specifications of architects which are founded wholly on a personal opinion, backed by no engineering principles, and the producer ought to be able to successfully combat such specifications.

He gave as a case in point the experience of one producer who was asked to fill a state specification, copied from the specifications of another state. This prescribed certain limits of grading, and the limits were such that a material to meet them could not possibly be made from the deposit, although a perfectly good aggregate (in this case, sand) could be made from it. The National Sand and Gravel Association succeeded in showing this to the state authorities so that the specification was changed, saving much money to the state as well as giving business to the producer.

The producer should know all about the testing of his product. In one case a producer who could and did test his product had cars rejected by the inspector on the job, but afterwards accepted by the state's material engineer. Investigation showed that the inspector did not know how to make a field test. He was taking his percentages by volume and using the volume of the mixed aggregate as a base instead of the sums of the volumes of the various sizes. Since a mixed aggregate has a much less volume than the sized components, all his determinations were wrong.

Mr. Walker gave several other instances of the kind, all showing how important it was that the producer should know as much as possible about his product.

In concluding he spoke on the research work of the National Sand and Gravel and National Crushed Stone Associations. Both associations plan to install laboratories, but it is intended that each will not duplicate the work of the other. Each has its own proper field of research in which it will work. He also spoke of the coming sand and gravel convention at Detroit and told of some features of the program.

The Trend of Aggregate Specifications

R. W. Gamble, of the department of public works, Milwaukee, read an excellent paper on: "What Is the Trend of Mineral Aggregate Specifications?" He said that the great improvement in paving had come from the use of better materials and spoke of the change brought about in the last few years from a time when anything that looked like sand would pass to the present day buying of high grade material that met somewhat exact specifications.

He touched briefly on present specifications based on arbitrary mixes and said they were really "cement content specifications." Then he explained the modern method of writing concrete specifications by fixing the water-cement ratio and showed how the adoption of the method would be to the advantage of the public, the contractor and the aggregate producer. The public would benefit by always getting what it paid for in concrete strength, the contractor would be given a wider latitude in his work since he could choose his own materials, within certain limits, and get the required strength with the least expense. The aggregate producer would profit as the contractor would have to buy only well prepared materials to make any money. The yield from clean and well graded aggregates would be so much greater that he could not afford to use any other kind if he got them for nothing.

As an example of the increased yield from well prepared aggregates he instanced an aggregate with 45% voids from which only 22 cu. ft. of concrete was mixed at each batch. By using aggregates with 35% voids the yield was raised to 24 cu. ft. for each batch. The saving of 9% not only applied to the cement but to the labor of placing and other costs, since everything was worked on a batch basis.

It is not possible to use the water-cement specification for all city paving now, but a beginning has been made and it will probably be in use everywhere in five or 10 years.

The trend of present specifications was toward: Avoidance of bulking, the combining of materials, the preventing of segregation and the selling and combining of materials by weight and not by volume.

Power Shovels

Power shovels was discussed by George H. Mueller of the Koehring Co., Milwaukee. His remarks were confined to the shovel with a 1½-yd. dipper which is mostly used by members of the association. He began with the development of the shovel, from the crude machine with only one engine and a number of

transmissions to the modern machine with motors for separate operations.

He showed that the size of the dipper does not regulate the output, since it is possible to have differences as great as 500% with shovels using the same size of dipper. These differences may be due in part to working conditions and in part to the speeds of the various operations, since it is possible for a shovel to have sufficient power and yet be slow.

Oil Engine Power for Plants

"Oil Engine Power for Plants" was the subject of a talk by J. W. Chadwick of the Chicago office of the Ingersoll-Rand Co. The subject was treated in a general way, the history of internal combustion engines being given in some detail.

For aggregate plants Diesel engines have a great advantage in being used with direct drive, which usually saves about 25% of power and makes for a less expensive installation. Any plant that uses an engine of more than 50-hp. can afford to install a Diesel engine.

The thermal efficiency of various prime movers he gave as: Small steam plants, 3 to 5%; large steam plants, 8 to 10%; gas engines, 20 to 25,% and Diesel engines, 30 to 33%. But his hearers must not be misled by any figures of efficiency, as efficiency means nothing except for what it shows in the cost sheet.

The Value of Safety Work

Fred M. Wilcox, chairman of the Wisconsin Industrial Safety Commission, spoke on the "Value of Safety Work in Aggregate Plants." But much of his talk had to do with conditions set up by political considerations and not connected with the aggregate industry at all. One part, worth repeating, is the advantage of having safety and industrial laws enforced by commissions instead of elected officers. Political pressure was much less liable to break down the work where a commission could count on a continuous and uniform program. And all but one or two states had finally come to that opinion.

Unfortunately there are still about 20,000 serious industrial accidents in Wisconsin which cost more than $5,000,000, not including incidental losses. Statistics showed the largest source of accidents to be the use of punch presses, accounting for almost half. The next was the use of circular saws and the next the use of poorly built scaffolding.

Quarries and sand pits have their own problems. The caving down of gravel and the rolling of broken stones have been a fertile source of accidents, less with larger, well-managed companies than with small companies. Explosives make another source, and many explosive accidents could have been prevented if proper shelters had been provided. Misfires cause many serious accidents and men should be prevented from going near a hole for some time after it had misfired. Some authorities said that a half hour was not too long to wait. Heavy lifting which caused hernia was an accident found almost nowhere else than in quarries, and men should be cautioned against trying to lift too heavy pieces. Dropping tools and other things was a source of accident common in almost all industries.

He called attention to the section of the law that said two men skilled in first aid must be present in quarry and mine workings and he said that Wisconsin did better than most states in providing first aid men. Over 2000 men had been trained in first aid by the commission.

He especially asked that foremen be alive to the responsibility of preventing accident, since they are always on the job.

Wisconsin's 1928 Highway Program

The last sentences of the talk of H. J. Kuelling, state highway engineer, made everyone sit up and take notice, as they outlined a revolutionary method of building concrete highways which, he said, would be tried out in 1928. Briefly, it is to build concrete highways of a character deemed necessary after a traffic survey, a 6-in., an 8-in. or even a 10-in. slab being laid, and to hold the contractor to a strength specification rather than to a determined mix and other limitations. The contractor will use whatever cement and aggregates he may choose and in what proportions he may choose, so long as he gets the required 7-day and 28-day strengths and uses material known to be sound and durable. He will have to be an engineer or employ a good engineer in order to do this.

It is not intended to build all concrete highways in this manner in 1928, but the method will be given a fair trial.

The highway problem was never so acute as it is today, and it will never be solved. Material men need not think they will have to go out of business because a program is completed, because there will be a continual and increased demand for more roads, better roads and wider roads. The good roads of today will be the bad roads of tomorrow and condemned because they are too narrow, too crooked or because the grades are too steep.

Wisconsin has certain specific problems, the removal of snow, the filling in of "missing links" in present highways and the establishment of a skeleton system of through highways, the last two problems coming from using the county system in building highways. But the through highways must be provided as a cold matter of business to hold the tourist trade. This amounts to about $117,000,000 spent by people who live in other states, and there is reason to believe that this sum could be increased to $200,000,000. Other states are after this business. Iowa is building 700 miles of paved roads this year in the effort to attract tourists from Wisconsin and Minnesota is planning extensive road building to the same end.

He gave some very startling figures on the economy of concrete roads as compared with gravel roads. He figured the cost of a gravel road at $5000 per mile and a concrete road (slab only, not grading) at $22,000 per mile. Then he assumed a traffic of 500 vehicles a day, increased by 8% yearly. Maintenance costs, interest and upkeep were figured on the basis of United States government findings for these things.

With these assumptions he figured the cost of gasoline and tire and vehicle consumption for each type of road, again taking the figures that had been determined by the government. When this was done, it was found that the concrete road provided so much cheaper transportation to the public that $173,000 would have been saved on one mile in 20 years. The reason that the possibility of such saving by building concrete roads is not appreciated is that the saving in gasoline, tires and vehicle wear is not usually computed. Yet this is the largest single item in the calculations.

Of course this does not mean that Wisconsin will stop building gravel roads and build nothing but concrete roads. The state cannot do it because it cannot finance such a program. Its credit would not stretch so far. But the computation shows that concrete roads should be built wherever they can be financed.

The 1928 program will unfortunately call for less building of concrete roads than were built in 1927. This is because there were less county bond issues by about 15 or 20%, and so only 300 miles or so of concrete can be laid.

Large Attendance Present

There were 122 persons who attended the first morning session and the other sessions were almost equally well attended. The papers were listened to with interest, the discussion was intelligent and there would have been much more discussion if the time had permitted.

The success of the meeting was largely due to the efforts of Gordon Daggett, association secretary.

New officers of the Wisconsin Mineral Aggregate Association are: President, C. L. Nutt, Moraine Gravel Co.; vice-president, W. A. Rowe, Wissota Sand and Gravel Co.; secretary-treasurer, G. D. Francey, Francey Stone and Supply Co. Directors, R. C. Brown, Western Lime and Cement Co.; J. K. Jensen, Janesville Sand and Gravel Co.; N. K. Wilson, Waukesha Lime and Cement Co.; George Brew, Waukesha Washed Sand and Gravel Co.

Representatives of 24 leading machinery manufacturers and sales agencies had tables in a room adjoining the meeting.

Foreign Abstracts and Patent Review

Porous Concrete. The use of concrete for dwelling houses has been handicapped somewhat by considerations of appearance, soundproofness, heat conductivity, resistance to weathering, and difficulty of driving nails, etc. To offset these disadvantages efforts were made to produce a porous concrete, so-called gas concrete, in many countries. Gas concrete is a heterogenous material representing a hardened mass of cement concrete full of tiny gas bubbles. This may be accomplished by two processes: (1) A foamy solution may be added to the fluid cement mortar in the mixer or (2) snow, ice or paraffin may be added to a still plastic concrete, whose hardening causes these admixtures to melt. There are more practical methods making use of certain metals, such as aluminium and zinc, many of which have been patented in America, Germany and France. However, none of these methods have yet found extensive application.

Among the requirements for gas concrete are low heat and sound conductivity, sufficient resistance to weathering and satisfactory compressive strength. Due to the porosity of gas concrete, its strength is considerably lower than that of ordinary concrete but it has important advantages when driving nails, drilling, etc., are concerned. Gas concrete can be molded into blocks, slabs, stairs, etc., and can be placed by a continuous process. The cost of gas concrete should remain below that of ordinary concrete to assure successful competition. Further experimenting with gas concrete will undoubtedly be of great benefit.

The substance used to produce gas evolution in the concrete should be harmless to the concrete, should react with water alone without complicating the process by reacting with constituents of cement or specially added admixtures, and should produce gases harmless to workmen and inhabitants of the buildings. The rate of reaction is also of importance. Gas evolution should stop when hardening of cement begins, as further gas evolution would produce no corresponding volume expansion. This rate is influenced by the fineness of the metallic admixtures which produce a desirable greater number of smaller bubbles.

The concrete mass should be sufficiently plastic, yet not too fluid as it would then permit the gases to escape. The more viscous the mass, the better are the gas bubbles retained. This formation of a colloidal mass is also influenced by the properties of the aggregate, a sand with a slight content of loam reacting better than a washed river sand.

Of the three constituents of cement which may be used as admixtures of pure elements or their compounds, silicon, calcium and aluminium are to be considered. Silicon, however, is entirely unsuitable due to extreme slow activity. Aluminium, though theoretically suitable, in practice immediately receives a protective coating stopping further reaction with water. Another handicap in the use of aluminium is that it has to be used in the form of aluminium bronze which floats on water and does not become uniformly suspended. Pure calcium has also proven unsuitable due to its slow rate of reaction.

It occurred to the author (**Dr. Julius** Meyer) to experiment with alloys of calcium with aluminum, zinc and magnesia. The latter elements enabled him to vary the rate of reaction from 30 minutes to 2 hours. The resulting gas was practically pure hydrogen, which in spite of a slight odor due to impurities, was perfectly harmless. Best results were obtained with calcium-zinc and calcium-magnesium compounds the latter developing the most hydrogen per gram of metal. The specific gravity of powdered calcium-magnesium is about 1.5, so that 100 cc. of the powder weigh 150 gm making computations relatively simple.

Tests were made to study the behavior of calcium-magnesium in contact with cement and cement concrete. Both constituents of this alloy react with water to form hydrogen and calcium-and magnesium hydroxide. The latter products react with the silica of the cement to form gelatinous soluble products, calcium- and magnesium silicate and, possibly, some calcium aluminate. As the alloy is added in amounts of 0.1 to 0.5%, the composition of the concrete mix is not changed thereby.

Fine, dry sand was mixed with ordinary or early high strength cement in different proportions. And a certain amount of finely pulverized calcium-magnesium alloy mixed in. Water was added to obtain a pasty consistency and the paste introduced into glass tubes 5 cm. in diameter and 20 cm. high, placed on a greased glass plate. The first tube was filled with a pure sand-cement mix.

The tests covered the following variables: quantity of admixture, sand-cement proportions and kind of aggregate. Observations were made for : Volume expansion, rate of expansion, maximum height reached, density of products and temperature variations.

In the first series 50gm. cement were mixed with 150gm. sand and 0.01 to 1.5% alloy (70% Ca and 30% Mg). The results showed that the actual height lags behind the theoretically computed rise. This is due to escaping hydrogen which is not useful in producing volume expansion. Another important conclusion was that the quantity of admixture had a definite maximum, beyond which the volume expansion reached a peak and dropped, as the mass became too foamy to hold its shape. Higher percentages of admixture also produce an undesirable rise in temperature.

Another series included cement-sand mixes of 1:3 to 1:6. Results agreeing with those of series I were obtained. The optimum admixtures were 0.1 to 0.5%.

To prevent the gas from escaping an attempt was made to increase the colloidal properties of cement-sand mixture by varying the sand through admixtures of loam, lime, etc. Thus 50gm. of cement and 200gm. of sand were mixed with 30cc. of a 0.1% loam solution and 40cc. water. An admixture of 0.1% alloy gave a maximum volume expansion of 53%; 0.25% alloy is 79% and 0.5% alloy 110%. The dry quartz sand used in the experiments was least favorable to colloidal formation. The use of sand with a slight loam content is of advantage.

Specimens permitted to harden showed a uniform development of pores with 0.5% alloy, higher admixtures producing irregular large pores. In large size specimens the pressure of the upper layers causes small pores at the bottom. Best results are obtained by placing gas concrete in layers less than 50 cm. thick, using care that no water escapes from the mass.

Tests of compressive strength showed the effect of reduced specific gravity. The specific gravity of massive concrete is about 2.4, while that of gas concrete with 0.25% admixture was but 1.3. The values of compressive strength ranged from 95 kg. per sq. cm. to 55 kg. per sq. cm. (1249 to 781 lb. per sq. in.).

Laboratory and field tests have shown that even lighter materials may be obtained when coke, pumice, sawdust, etc., are used. Hog bristles or asbestos fibres may be added to help the mass keep its shape. Various designs may be manufactured from gas concrete filling the holds to about 70%. Within one hour the mold becomes filled due to the gas evolution.

Emil Asmus, an architect in Breslau, used gas concrete with a quick hardening cement, enabling him to place a second layer about three hours after the first one, thus adapting gas concrete for use in pouring walls of buildings in a continuous operation. The layers should not exceed 30cm. when poured or 40 to 50cm. after expansion has taken place, giving a total height of 120 to 150cm. a day.—*Zement* (1927) 1002-1004, 1026-29.

Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
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Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts), as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	Nov. 5	Nov. 12	Nov. 5	Nov. 12
Eastern	2,516	2,397	14,290	11,969
Allegheny	3,111	3,969	9,942	7,772
Pocahontas	513	503	1,065	955
Southern	642	503	12,606	12,121
Northwestern	1,417	850	8,409	6,973
Central Western	413	379	11,456	9,711
Southwestern	386	445	7,290	6,288
Total	8,998	9,046	65,058	55,789

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1926 AND 1927

	Limestone Flux		Sand Gravel and Stone	
	1926	1927	1926	1927
	Period to Date		Period to Date	
District	Nov. 13	Nov. 12	Nov. 13	Nov. 12
Eastern	153,932	152,519	484,500	493,029
Allegheny	177,270	163,470	358,873	361,463
Pocahontas	23,821	23,208	41,359	42,797
Southern	29,561	26,823	561,608	553,171
Northwestern	66,513	60,974	302,733	305,258
Central Western	22,985	22,845	420,777	432,092
Southwestern	13,467	16,129	237,779	254,419
Total	487,549	465,968	2,407,629	2,442,229

COMPARATIVE TOTAL LOADINGS 1926 AND 1927

	1926	1927
Limestone flux	*487,549*	*465,968*
Sand, stone, gravel	*2,407,629*	*2,442,229*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning December 3:

CENTRAL FREIGHT ASSOCIATION DOCKET

17047. To establish on **crushed stone, gravel and sand**, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica, carloads, from Kenneth and Lake Ciecott, Ind., to stations on the C. A. & S. Ry., Mt. Ayr, Ind., to Wilders, Ind., inclusive, as shown below: Rates apply per net ton.

Station—	Proposed rate.	Present rate.
Mt. Ayr, Ind.	$0.90	$1.10
Fair Oaks, Ind.	.95	1.10
Zadoc, Ind.	1.00	1.10
Wheatfield, Ind	1.00	1.10
Wilders, Ind.	1.05	2.60

17048. To establish on **gravel and sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), carloads, Macksville, Ind., to Centre Point, Ind., rate of 65c per net ton. Present rate, 76c per net ton.

17049. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, Ft. Harrison and South Terre Haute, Ind., to Andres, Ill., rate of $10 per net ton, and to Peotone and Whitaker, Ill., $1 per net ton. Route, via C. M. & St. P. Ry., Delmar, Ill., and C. M. & G. Ry. Present rate, 6th class rate.

17050. To establish on **sand** (except blast, core engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, Columbus, Ohio, to Amesville and Lathrop, Ohio, rate of 90c per net ton. Present rate, $1.10 per net ton.

17072. To establish on **sand and gravel** (all kinds), carloads, Columbus, Ohio, to Zanesville, Ohio, rate of 80c per net ton. Present rate, 13½c.

17073. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel**, carloads, Cayuga, Ind., to Metcalf, Ill., rate of 70c per net ton. Present rate, 75c per net ton.

Note 1—Minimum weight marked capacity of car.
Note 2—Minimum weight 90% of marked capacity of car.
Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

17074. To establish on **crushed stone, sand and gravel**, carloads, to Ludlow Falls, Kessler and Troy, Ohio, from Lewisburg, Ohio, and Ft. Jefferson, Ohio, following rates. Present and proposed rates (in cents per net ton):

	From Lewisburg, O. (Crushed stone)	
To	Present	Proposed
Ludlow Falls, Ohio	70	60
Kessler, Ohio	70	60
Troy, Ohio	70	60

	From Ft. Jefferson, O. (Sand and gravel)	
To	Present	Proposed
Ludlow Falls, Ohio	60	....
Kessler, Ohio	70	60
Troy, Ohio	70	60

17102. **Gravel and sand** (all kinds), Lodi, Ohio, to Akron, Ohio, via A. C. & Y. Ry., 70c net ton. Terminal charges to be in addition to rate proposed. Present rate, 11½c.

17104. **Crushed stone**, Maple Grove, Gibsonburg and Woodville, Ohio, to Fraser, Mich., $1.10 net ton. Present rate, $2.07 net ton.

17106. 11c on **agricultural lime** and $1.50 net ton on **agricultural limestone**, McVittys, Ohio, to Lathrop, Ohio (Federal Valley R. R.). Present rate, 16c on agricultural lime and 20c on agricultural limestone.

17172. **Crushed stone and agricultural limestone**, from Silica, Ohio.

	Present		Pro-
To—	(a)	(b)	posed
Grand Rapids	$1.84	$1.89	$1.35
Kalamazoo	1.73	1.76	1.27
South Haven	(1)	(1)	1.40
Niles	(1)	(1)	1.40
Cassopolis	(1)	(1)	1.35
Allegan	1.84	1.89	1.32
Battle Creek	(1)	(1)	1.25
Schoolcraft	1.73	1.76	1.27
Three Rivers	1.28	1.39	1.22
Lansing	1.38	1.39	1.17
Eaton Rapids	1.38	1.39	1.12
Albion	1.38	1.39	1.07
Durand	(1)	(1)	1.12
Howell	(1)	(1)	1.02

(a) crushed stone. (b) Ground limestone. (1) Sixth class.

TRUNK LINE ASSOCIATION DOCKET

16935. (A) **Sand** (other than blast, engine, foundry, glass, molding, quartz, silex and silica), **and gravel**, carloads; (B) **sand, blast, engine, foundry, glass, molding, quartz, silex and silica**, carloads (See Note 2), from Raritan River R. R. stations to Palmerton, Pa.; (A) $1.60 and (B) $1.80 per ton of 2000 lb. Reason—Proposed rates are comparable with rates now published from Perth Amboy district as per L. V. R. R. I. C. C. C8085.

16942. **Sand and gravel**, carloads (See Note 2), from Perth Amboy, N. J., district to New Village and Oxford Furnace, N. J., $1.55 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates now in effect to East Allentown and Catasauqua, Penn.

14341, Sup. 1. **Slate, crushed or ground, and slate, dust**, carloads, minimum weight 50,000 lb., from Philadelphia, Penn., to Somerville and New Brunswick, N. J., 10c per 100 lb.

16990. **Limestone, agricultural, ground, precipitated or pulverized, and limestone dust**, carloads, minimum weight 50,000 lb., from Jamesville and Rock Cut, N. Y., to Canisteo, N. Y., $2.10; Bennets and Greenwood, N. Y., $2.10; Bennetts and Greenwood, N. Y., $2.20; Rexville, N. Y., to Rose Lake, Penn., inclusive, $2.30, and Woodville to Myrtle, Penn., inclusive, $2.50 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates from Buffalo to Bennetts, N. Y., Sharon Center, Penn., and Myrtle, Penn., and from Jamesville, N. Y., to Stockport, Wallace and Hornell, N. Y.

17007. **Limestone, ground or pulverized, and stone dust**, carloads, minimum weight 50,000 lb., from Jamesville and Rock Cut, N. Y., to Inghams and Dodgeville, N. Y., $1.60, and Salisbury Center, N. Y., $1.70 per ton of 2000 lb. Reason—Proposed rates compare favorably with rates now in effect to Little Falls, N. Y.

17015. **Lime, agricultural**, land, chemical, gas or glass, carloads, minimum weight 50,000 lb., from Bellefonte and Pleasant Gap, Penn., to Tacony (Philadelphia), Penn., 11c per 100 lb. Reason—Proposed rates are comparable with rates now in effect to Frankford, Bridesburg and North Philadelphia, Penn., as per P. R. R. G. O.-I. C. C. 14567.

17026. **Sand**, carloads (See Note 2), from Springtown, N. J., to Phillipsburg, N. J., 40c per ton of 2000 lb. Reason—To place the shippers at Springtown, N. J., on a comparable basis with shippers at Carpenterville, N. J.

17039. **Marble, viz.: broken, chips, crushed dust, rubble and waste**, carloads, minimum weight 50,000 lb., from Pleasantville, Paterson and Wingdale, N. Y., to Fords, N. J., 15½c per 100 lb. Reason—Proposed rates are the same as recommended from Wingdale, N. Y., to Newark, N. J.

17043. **Crushed stone**, carloads (See Note 2), from Spahr's, Md., to Camp Meade, Md., $1.05 per ton of 2000 lb. Reason—Proposed rate compares favorably with rate on like commodity for like distances, services and conditions.

17052. **Crushed stone**, carloads (See Note 2), from Port Deposit, Md., to Yorklyn, Del., proposed rate of 125c per ton of 2000 lb. Reason—To establish rates which will be comparable with those in force from Philadelphia, Penn., to Yorklyn, Del., as per P. R. R. G. O.-I. C. C. No. 14287.

17057. **Lime, agricultural and land**, carloads, minimum weight 30,000 lb., from Mt. Pleasant, Penn., to the following points, rates in cents per 2000 lb.:

To	Prop. Rate	To	Prop. Rate
Lucinda, Penn.	$2.30	Friendsville, Md.	$2.02
Crown, Penn.	2.30	Berlin, Penn.	2.02
Somerset, Penn.	2.02	Rockwood, Penn.	2.02
Melcroft, Penn.	2.38	Ohio Pyle, Penn.	1.64
Boswell, Penn.	2.14	Indian Cr'k, Penn.	1.64
Confluence, Penn.	1.89		

Reason—Proposed rates compare favorably with rates now in effect from Hyndman, Penn., to points in the same general territory as per B. & O. R. R. I. C. C. 20458.

16868, Sup. 1. **Lime, building, agricultural, chemical and land**, carloads, minimum weight 30,000 lb., from stations in the Cavetown and Thomasville groups to Sodus, N. Y., 19c per 100 lb.

17084. **Sand, blast, engine, foundry, glass, molding, quartz, silex, silica and filter, also molding gravel**, carloads (See Note 2), from Williamsport,

Penn., to Park Place, Penn., $2.30 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates to Meshoppen, Mehoopany and Orwigsburg, Penn., as per Reading Co. I. C. C. 301.

17092. **Sand** (other than blast, engine, foundry, glass, molding or silica), carloads (See Note 2), from Bethlehem, Penn. (C. N. J.), to Reading Co. stations, rates ranging from 70c to $2.20 per ton of 2000 lb. Reason—Proposed rates are comparable with rates recommended on crushed stone between the same points.

M-834. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Texas and Cockeysville, Md., to York, Penn., Ashland to Glencoe, Md., Parkton, New Freedom, Shrewsbury, Brilhart, Penn., and *Glenrock, Penn., 90c per ton of 2000 lb. Reason—To establish rates which will be comparable with rates from Baltimore, Md., to Octoraro, Perryville, Rowlandville, Md., and from Patapsco, Md., to Havre-de-Grace, Md., as per P. R. R. G. O., I. C. C. No. 14343.

*Will only apply from Cockeysville, Md.

16917. (A) **Sand, blast, engine, foundry, glass, molding and silica,** carloads, (B) **sand** (other than blast, engine, foundry, glass, molding and silica) **and gravel,** carloads (See Note 2), from Perth Amboy District, N. J., to D. L. & W. R. R. stations and L. & N. E. R. R. stations, Bangor, Pen Argyl, Wind Gap, Grand Central, Saylorsburg Jct., Nazareth, Hercules, Penn., and points in the same district. (A) $1.95 and (B) $1.85 per ton of 2000 lb. Reason—Proposed rates are the same as now in effect from Perth Amboy district to Stroudsburg, Penn., as per L. V. R. R. I. C. C. C-8085.

16929. **Common sand and gravel,** carloads, from Springtown, N. J., to Nazareth, Penn., 90c per ton of 2000 lb. Reason—Proposed rate compares favorably with rates on like commodities to Bath, Penn., and Pittstown, N. J., as per C. N. J. I. C. C. G-2909 and 2038.

SOUTHWESTERN FREIGHT BUREAU DOCKET

13691. **Sand and gravel,** from Ft. Gibson, Okla., to stations on Ft. S. S. & R. I. R. R. To establish the 9702 joint line scale as per S. W. L. Tariff 114C on sand and gravel, carloads, from Ft. Gibson, Okla., to stations on the Ft. S. S. & R. I. R. R. It is stated that as the 9702 scale is applicable to Paris, Ark., that there should be no objection to extending this scale beyond Paris, Ark.

WESTERN TRUNK LINE DOCKET

6289. **Sand and gravel,** carloads, uniform minimum weight, from Nicols, Minn., to St. Paul, Minn. Present, 3c per 100 lb.; proposed, 2c per 100 lb. (Proposed rate to be subject to the joint rate basis prevailing on Minnesota intrastate traffic but not to be subject to the provisions of Jones' Tariff No. 228.)

6296. Rates and minimum weight: **Stone, crushed,** carloads, from Quincy, Ill., to Eau Claire, Wis., and group, Oshkosh, Wis., and group, Menominee, Mich., and group. Present—No commodity rates. Proposed—To Eau Claire, 12c; Oshkosh, 13c; Menominee, 13c. Present minimum weight—Classification. Proposed—As in Note 3. In no case shall the minimum weight be less than 40,000 lb.

496J. **Limestone, agricultural, ground or pulverized,** in bags, barrels or in bulk, for soil treatment, carloads (See Note 2), from Quincy and Marblehead, Ill., Hannibal, White Bear and White Rock, Mo., to stations on the C. B. & Q. R. R. in Iowa. Present—Class rates. Proposed—The following scale, representative distances, rates in cents per 100 lb.:

Miles		Miles	
40	59	175	125
70	71	200	135
100	88	225	144
130	107	250	150
150	115		

6216, Sup. 1. **Limestone, agricultural,** between stations in Iowa and Wisconsin on C. M. & St. P. Ry. Since the issuance of Docket Advice 6216, reissued, listed in Docket Bulletin 1946 of October 28, 1927, the following has been received from the proponent carrier:

"Since placing the subject on the docket, we have been requested by the .... to provide for basis of rates between Iowa and points in Wisconsin, and request, therefore, that docket be amended to propose provision for the scale of rates suggested between stations in Wisconsin and stations in Iowa, as well as stations in Illinois and stations in Iowa. Further, the proposed rates for distances of 35, 40, 60, 65 and 185 miles are 64c, 68c, 80c, 82c and $1.29 respectively, and it is desired that these figures be revised to 70c, 70c, 90c, 90c and $1.30, respectively, the revised figures representing the Illinois-Wisconsin crushed stone rates for like distances, it being felt proper to observe the rates made under Illinois-Wisconsin scale as minimum."

Docket Advice 6216, reissued, of October 28, 1927, should be considered amended accordingly.

2292E. **Stone, crushed,** carloads, usual minimum weight, from Randville, Mich., to Chicago, Ill. Present, 12c per 100 lb.; proposed, 10c per 100 lb.

Investigation Into Rates of Cement Is Announced

THE Interstate Commerce Commission on November 26 announced the institution of an investigation, No. 20303, into the reasonableness and lawfulness of the interstate freight rates on cement, in carloads, for all hauls of 80 miles and less included within the territory bounded by the following lines:

The international boundary between the United States and Canada on the north, the Buffalo-Pittsburgh line, the Ohio river and the Mississippi river south of Cairo, Ill., on the east; the Ohio river, Gulf of Mexico and international boundary between the United States and Mexico on the south, and the western boundary of that portion of Texas, Colorado, Wyoming and Montana in which the so-called 8182 basis of cement rates, or rates related thereto, now applies, on the west.

All common carriers by railroad subject to the Interstate Commerce Act were made respondents to the proceeding.

Long-and-Short-Haul Provision Restricted in Cement Rate Case

THE INTERSTATE COMMERCE Commission, on November 28, made public a report on further hearing in the case entitled Western Cement Rates, No. 8182 on its docket, in which it prescribed maximum rates on cement in western trunk line territory and between points in that territory and trans-Missouri territory and southwestern Missouri.

By the report on further hearing the relief from the long-and-short-haul provisions of the fourth section of the interstate commerce act granted in the former reports is restricted so as not to apply over unduly circuitous routes.

After a review of the former decision and its relation to the fourth section questions involved, the report of the commission states in conclusion:

We find nothing of record in the instant case, especially in view of the evidence that traffic is being handled over unduly circuitous routes, to warrant the continuance of fourth-section relief without limitations similar to those imposed in connection with the fourth-section relief granted in the above proceedings.

Fourth Section Order Amended

Fourth-section order No. 7260 therefore will be amended so that the relief authorized therein shall not apply (1) where the short line is 150 miles or less and the longer line or route is more than 70% circuitous; (2) where the short line exceeds 150 miles in length and the longer line or route is more than 50% circuitous, provided, however, that where the short line exceeds 150 miles and the longer line or route does not exceed 255 miles, relief will apply to such longer line or route even though the said longer line or route is more than 50% circuitous.

In complying with the provisions of this order distances to and from points that are not basing points may be disregarded and distances to and from points on which they base may be used in lieu thereof.

The difficulties encountered by the carriers in Brick and Clay Products in the South, supra, and other cases cited, in publishing rates subject to the conditions imposed in connection with the fourth-section relief granted therein, which were precisely the same as those stressed by the carriers herein, were overcome by the use of rules similar to that referred to above.

Rules in Cited Cases Rejected

The rules authorized in those cases, however, are not adapted to use in the instant case, as their application would not result in a substantial compliance with the above limitations because of the manner in which the scales prescribed herein are graded. For example, under the rule described above the rates prescribed herein for distances of 150 miles and less would be applicable over routes far in excess of 170% of the distance over the short lines, as illustrated in the following:

The rate in Scale II prescribed herein for distances of 45 miles and over 30 miles is 8.5 cents. Under the above rule the carriers would be authorized to apply this rate over routes over which the distance would be 170% of 45 miles, or 77 miles. If the short-line distance between any two points is 31 miles the circuitous route could be 77 miles long, nearly 150% longer than the short route.

The rate prescribed for distances of 80 miles and over 60 miles is 10 cents. Under the rule the application of this rate would be authorized over a circuitous route of 136 miles, more than 120% greater than the shortest distance for which the rate was prescribed. If the short-line distance is 61 miles the rule would permit the applicants to meet the short-line rate over a route more than 120% longer than the short line.

Option Given Carriers

We are not willing to approve in this case a rule which would permit the short-line rates to be applied for distance computed on this basis. If, however, the carriers desire to avoid the publication of specific routings in connection with the rates authorized herein we see no objection to the use of a rule which will show, in the second column, distances that are 150 or 170%, as the case may be, of the average of the maximum and minimum distances over 30 miles for which a given rate applies.

For example, under Scale II prescribed herein a rate of 10 cents applies for distances of 61 to 80 miles, inclusive. The average distance for which this rate applies, eliminating fractions, is 71 miles, 170% of which is 121 miles.

May Show Specific Routine

The use of this rule in some instances would prevent the application of the short-line rates over circuitous routes less than 50 and 70% circuitous. On the other hand, where the distances between competitive points over the short and more direct routes are the lower distances for which any specific rate is prescribed, such rate could be applied over lines or routes more than 50 and 70% circuitous. The order will be amended so as to permit the use of this rule. The publication of such a rule is optional and carriers may show specific routing in connection with any rates if they desire.

An appropriate order will be entered.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	....	1.60	1.30	1.30	1.30
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Danbury, Conn.	2.25	2.25	2.00	1.75	1.50	....
Dundas, Ont.	.30	1.05	1.05	.90	.90	.90
Frederick, Md.	.50@1.00	1.35@1.50	1.15@1.50	1.10@1.15	1.05@1.10	1.05@1.10
Munns, N. Y.	1.00	1.50	1.50	1.40	1.25	....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@ .60	1.40@1.60	....
Prospect, N. Y.	1.00	1.40	1.25	1.25	1.25	....
Rochester, N. Y.	1.50	1.50	1.50	1.50	1.50	1.50
Walford, Penn.	....	....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.50	.50	.50	.50	.50	1.50
Alton, Ill.	1.85	....	1.85	....	....	....
Buffalo and Linwood, Iowa	1.10	....	1.45	1.25	1.30	1.30
Chasco, Ill.	1.00@1.30	....	1.00@1.15	....	1.00@1.15	....
Columbia and Krause, Ill.	.90@1.20	.90@1.20	1.00@1.20	1.00@1.20	1.00@1.20	1.25
Dubuque, Iowa (e)	.75	1.20@1.30	....	1.20@1.30	1.20@1.25	....
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
River Rouge, Mich.	1.20	1.20	1.20	1.20	1.20	1.20
Milltown, Ind.	....	.90@1.00	1.00@1.10	.90@1.00	.85@ .90	.85@ .90
Mt. Vernon, Ill.	1.10@1.20	1.00	1.00	1.00	1.00	....
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	....
Stone City, Iowa	.75	....	1.30	1.20	1.00	....
St. Vincent de Paul, Que.	.70	1.35	1.00	.85	.80	1.25
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Toronto, Ont.	1.55	2.05	2.05	1.90	1.90	1.90
Valmeyer, Ill. (fluxing limestone)	.90@1.20	....	....	1.75	....	1.75
Waukesha, Wis.	.90	....	....	.90	.90	.90
Wisconsin Points	.50	....	1.00	.90	.90	....
Youngstown, Ohio	.70j	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h	1.25l@1.35h
SOUTHERN:						
Alderson, W. Va.	.50	1.40	1.35	1.25	1.20	1.15
Atlas, Ky.	.50	1.00	1.00	1.00	1.00	1.00
Brooksville, Fla.	.75	....	2.65	2.65	2.40	2.00
Cartersville, Ga.	1.50	1.65	1.65	1.35	1.15	1.15
Chico and Bridgeport, Tex.	1.00	1.30	1.25	1.20	1.05	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	....	....
Graystone, Ala.			Crusher run, screened, $1 per ton			
Kendrick and Santos, Fla.			3½ in. and less, $1 per ton			
Ladds, Ga.	....	1.65	1.65	1.35	1.15	1.15
New Braunfels, Tex.	.60	1.25	1.10	.90	.90	.90
Rocky Point, Va.	.50@ .75	1.40@1.60	1.30@1.40	1.15@1.25	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kan.	.50	1.90	1.90	1.90	1.90	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	1.25	1.25	1.25	1.00	....
Rock Hill, St. Louis Co., Mo.	1.15	1.15	1.15	1.15	1.15	1.15
Sugar Creek, Mo.	1.15*	1.60†	1.60‡	1.60§	1.00¶	....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.80	1.70	1.45	1.20	1.05	....
Duluth, Minn.	.90	2.00	1.75	1.55	1.25	1.25
Dwight, Calif.	1.00	1.00	1.00	.90	.90	....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.65	1.35	1.25	....
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	....
Northern New Jersey	1.40	1.40	1.80	1.40	1.40	1.40
Oakland and El Cerito, Calif.	1.00	1.00	1.00	.90	.90	....
Richmond, Calif.	.75	....	1.00	1.00	1.00	....
San Diego, Calif.	.50@ .75	1.25@1.50	1.25@1.50	1.10@1.25	1.10@1.25	....
Springfield, N. J.	1.60	2.20	2.10	1.70	1.60	....
Toronto, Ont.	....	3.58@4.05	3.05@3.80	....	....	....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	....
Columbia, S. C.	....	....	2.00	1.80	1.65	....
Eastern New York—Syenite	.75	1.25	1.25	1.25	1.25	1.25
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.			Crushed flint rock, 2.50 per cu. yd.			
Graystone, Ala.—Granite	.50	....	....	....	....	....
Lithonia, Ga.—Granite	.75a	2.00b	1.75	1.40	1.35	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	....
Middlebrook, Mo.	3.00@3.50	....	2.00@2.25	2.00@2.25	....	1.25@3.00
Richmond, Calif.—Quartzite	.75	....	1.00	1.00	1.00	....
Rochester, N. Y.			Dolomite, all sizes, 1.50 per ton			
Somerset, Penn. (sand-rock)			1.50 to 1.85			
Toccoa, Ga.	....	....	1.40	1.25	1.25	1.25

(e) Price net after 10c cash discount deducted.
*¼ to ½ in. †¼ to 1 in. ‡¼ to 1¼ in. §¼ to 2¼ in. ¶Dust.
‖Rip rap per ton. (a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2in., 1.30. (h) Less 10c discount.
(j) Less 10% net ton. (l) Less .05. (e) Agstone to June 15, 1927. [1] ¾ to ¼ in. [2] 1 to ¼ in. [3] 1½ to ¼ in. (A) Plus 4% sales tax, less 2% discount 30 days.

Agricultural Limestone

(Pulverized)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$; 90% thru 100 mesh	6.00
$MgCO_3$; 90% thru 100 mesh	4.50
Atlas, Ky.—90% thru 100 mesh	2.00
50% thru 100 mesh	1.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh	5.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 93½%; $MgCO_3$, 3½%; 50% thru 50 mesh	1.50
Cartersville, Ga.—Pulverized limestone, 2.00; 50% thru 100 mesh	1.50
Charleston, W. Va.—Marl, per ton, bulk	3.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Tex.—50% thru 50 mesh, 1.75; 50% thru 100 mesh	2.25
Cypress, Ill.—90% thru 100 mesh	1.35
Ft. Springs, W. Va.—50% thru 50 mesh	1.50
Hartford, Conn.—Paper bags, 4.25; cloth bags, 4.75; bulk	3.25
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags	3.95
Bulk	2.70
Jamesville, N. Y.—Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk	2.75
Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 100 mesh	3.50
Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk	2.70
Ladds, Ga.—Analysis, $CaCO_3$, 64%; $MgCO_3$, 32%; pulverized; 50% thru 50 mesh	1.50@ 2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk, 1.75; bags	3.75
Marl—Analysis, 90% $CaCO_3$; 10% $MgCO_3$; bulk, 2:25; bags	4.00
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Middlebury, Vt.—Analysis, 90.05% $CaCO_3$; 90% thru 50 mesh	6.00
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, $CaCO_3$, 97%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Syracuse, N. Y.—Analysis 89% $CaCO_3$; $MgCO_3$, 4%; bags, 4.25; bulk	2.75
Toledo, Ohio—30% thru 50 mesh	2.25
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.75; paper, 4.25; bulk	3.25
Carload, 7.50; less than carload	9.00

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis, 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	3.00
Atlas, Ky.—90% thru 4 mesh	1.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5%; $MgCO_3$; 90% thru 10 mesh	1.50
Brandon, Vt.—Bulk	4.00

(Continued on next page)

Agricultural Limestone

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 90% thru 100 mesh	3.50
Chicago, Ill. — 50% thru 100 mesh; 90% thru 4 mesh	.80
Columbia, Krause, Valmeyer, Ill. — Analysis, 90% $CaCO_3$; 100% thru 4 mesh	1.10@ 1.50
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	1.35
Danbury, Conn.—Analysis, 79% $CaCO_3$, 11% $MgCO_3$; 60% thru 100 mesh; 80% thru 50 mesh; 100% thru 4 mesh; bags, 4.25; bulk	3.25
Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh	1.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Kansas City, Mo. — 50% thru 100 mesh	1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92¼ $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
McCook, Ill.—90% thru 4 mesh	.90
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 100% thru 4 mesh; 20% thru 100 mesh	1.50
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Mountville, Va. — Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh; 50% thru 100 mesh, bags	5.00
Pixley, Mo. — Analysis, 96% $CaCO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes	1.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.15

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Joliet, Ill.—Analysis, 55% $CaCO_3$; 45% $MgCO_3$; 95% thru 100 mesh; paper bags	4.50
Marblehead, Ohio—Analysis, 80% $CaCO_3$; 99.8% thru 100 mesh; bulk	3.25
Piqua, Ohio, sacks, 4.50@5.00; bulk	3.00@ 3.50
Rocky Point, Va.—85% thru 200 mesh, bulk	2.25@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Buffalo, N. Y.	2.00@ 2.50
Cedarville and S. Vineland, N. J.	1.75
Estill Springs and Sewanee, Tenn.	1.50
Gray Summit and Klondike, Mo.	1.75@ 2.00
Klondike, Mo.	2.00
Los Angeles, Calif.—Washed	5.00
Massillon, Ohio	3.00
Mendota, Va.	2.25@ 2.50
Michigan City, Ind.	.35
Mineral Ridge and Ohlton, Ohio	2.50
Oceanside, Calif.	3.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.25
Pittsburgh, Penn.	3.00@ 4.00
Red Wing, Minn.	1.50
Ridgway, Penn.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.00
San Francisco, Calif.	4.00@ 5.00
Silica, Va.	2.00@ 2.50
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Thayers, Penn.	2.50
Utica and Ottawa, Ill.	.75@ 1.00
Zanesville, Ohio	2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Chippewa Falls, Wis.		.25*
Columbus, Ohio		.15@ .30
Dresden, Ohio		1.25
Eau Claire, Wis.	4.25	.65@ 1.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Asbury Park, Spring Lake and Wayside, N. J.	.80	.70	1.25	1.50		
Attica and Franklinville, N. Y.	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05		1.05
Erie, Penn.		1.00*		1.50*	1.75*	
Leeds Junction, Me.		.50	1.75		1.25	1.00c
Machias Jct., N. Y.	.75	.75	.85	.75	.75	.75
Montoursville, Penn.	1.00	.90	.85	.75	.75	.75
Northern New Jersey	.50	.50	1.25	1.25	1.25	
Portland, Me.		1.00	2.25		2.00	
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Penn.		2.00				
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Appleton and Mankato, Minn.		.45	1.25	1.25	1.25	1.25
Attica, Ind.			All sizes .75@.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.25@ .80	.50@ .70	.10@ .40	.50@ .70	.60@ .80	.60@ .80
Barton, Wis.		.50	.50	.60	.60	.60
Chicago district, Ill.	.70	.55	.55	.60	.60	.60
Columbus, Ohio		.75	.75	.75	.75	
Des Moines, Iowa		.30	1.30	1.30	1.30	1.30
Eau Claire, Chippewa Falls, Wis.	1.00	.50	.65	1.05	.95	
Elkhart Lake, Wis.	.60	.40	.60	.60	.50	.50
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Grand Haven, Mich.		.60@ .80	.70@ .90	.70@ .90		.70@ .90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50		.70		.70
Humboldt, Iowa	.50	.50	1.50	1.50	1.50	1.50
Indianapolis, Ind.	.60	.60	.75	.75	.75	.75
Joliet, Plainfield & Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Iowa	.50@ .60	.50@ .60	1.30	1.30	1.20	1.20
Mankato, Minn.				1.25	1.25	1.25
Mattoon, Ill.			.75@.85 all sizes			
Milwaukee, Wis.	.96	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn.	.65*	.65*	1.75*	1.75*	1.75*	1.75*
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.40@ .50	.40@ .50	1.40	1.35	1.25	
Pittsburgh, Penn.	1.25	1.25	.85	.85	.85	.85
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.20e	1.45f	1.55a	1.45	1.45	1.45
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.85	.80	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.25	1.15
Zanesville, Ohio		.60	.50	.60	.80	
SOUTHERN:						
Brewster, Fla.	.45	.45	2.75	2.50		
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.		River sand and gravel, all sizes, 1.40				
Chattahoochie River, Fla.		.70		1.75		
Eustis, Fla.		.50@ .60				
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Macon, Ga.	.50	.50				
New Martinsville, W. Va.	1.00	.90@1.00		1.30@1.40		.80@ .90
Roseland, La.	.25	.15	1.25	.85	.65	
WESTERN:						
Kansas City, Mo.		.70@ .75				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10@ .40	.10@ .40	.50@1.00	.50@1.00	.50@1.00	.50@1.00
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Phoenix, Ariz.		1.00*	2.00*	2.00*	1.10*	1.00*
Pueblo, Colo.	.70	.60		1.20		1.15
San Diego, Calif.		.40@ .50	.80@1.00	.80@1.00	.65@ .80	.65@ .80
Seattle, Wash.	1.25	1.25	1.25	1.25	1.45	1.25

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel. 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.85
Burnside, Conn.	.75					
Des Moines, Iowa	.50					
Dresden, Ohio	.50	.60	.70	.65	.65	.60
East Hartford, Conn.	.85*d					
Eau Claire, Chippewa Fls., Wis					.65	
Gainesville, Texas						.55
Grand Rapids, Mich.				.50		
Hamilton, Ohio					1.00	
Hersey, Mich.				.50		
Indianapolis, Ind.		Mixed gravel for concrete work, at .65				
Lindsay, Texas		1.10			.55	
Macon, Ga.	1.25‡					
Mankato, Minn.	.30					
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Roseland, La.					.50	
Somerset, Penn.		1.85@2.00		1.50@1.75		
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.60	.60	60	.60	.60	.50
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) River run. (c) 2½-in. and less ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramec River.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.00	2.00	2.00@2.25	1.50		4.00	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	1.75	1.75		1.75	1.75@2.00		
Buffalo, N. Y.	1.50	1.50		2.00@2.50			
Cedarville and S. Vineland, N. J.				2.25			
Columbus, Ohio	1.50@2.00	1.25@1.50	2.00	.30	1.75@2.00	2.75@4.50	
Dresden, Ohio	1.50@1.75	1.35@1.50	1.50@1.75	1.25	1.35		
Eau Claire & Chippewa Falls, Wis. (e)						3.00	3.00
Elco & Tamms, Ill.	Ground silica per ton in carloads—18.00@31.00						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Klondike, Mo.				2.00	2.00		2.00
Massillon, Ohio	2.25	2.25		2.25	2.50		
Mendota, Va.	Ground flint or silex—16.00@20.00 per ton						
Michigan City, Ind.				.30@ .35			
Millville, N. J.				1.75b		3.50	
Montoursville, Penn.				1.35@1.60			
New Lexington, O.	1.75	1.25					
Ohlton, Ohio	1.75b	1.75b		2.00b	1.75b	1.75b	
Ottawa, Ill.						3.50	
Red Wing, Minn. (d)					1.50	3.00	1.50
Ridgway, Penn.	1.50	1.50	1.75@2.00c				
Round Top, Md.				1.60		2.25	
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50@5.00†	3.50@5.00†	3.50@5.00†	
Silica, Va.	Ground glass sand, 140-mesh, per ton, 8.00@10.00						
Thayers, Penn.	1.25	1.25		2.00			
Utica & Ottawa, Ill.	.40@1.00f	40.@1.00f	.75@1.00	.40@1.00f	.60@1.00f	2.23@3.25	1.00@3.25
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	1.75*@2.00	1.75*@2.00	1.75	1.75*@2.00	1.75		
Zanesville, Ohio	2.00	1.50	2.00	2.00	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (b) Damp. (c) Shipped from Albany. (d) Filter sand, 3.00. (e) Filter sand, 3.00@4.25. (f) Crude and dry.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Dubois, Pa.	2.25	1.25	1.35	1.25	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.25		1.00			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*		1.45*	
Jackson, Ohio	2.05*	1.05*	1.55*	1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.45*		1.45*	1.45*	1.45*	
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.	2.05*	.80*	1.35*	1.25*	.90*	.90*	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.00
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95[4]
Chazy, N. Y.		8.50	7.50	10.00		15.50[1]	8.50	14.00
Lime Ridge, Penn.					5.00[2]			
Pittsburgh, Penn.	12.50	8.50	8.50		9.00	11.00		
West Stockbridge, Mass.	12.00	10.00	5.60					2.00[12]
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	10.50	8.50	10.50	8.50	1.65[7]
CENTRAL:								
Afton, Mich.							7.50	1.35
Carey, Ohio	11.50	7.50	7.50		9.00		8.00	1.50
Cold Springs, Ohio		8.50	8.50				8.00	
Cold Springs and Gibsonburg, Ohio	11.50	8.50	8.50		9.00	11.00		
Huntington, Ind.	12.50	8.50	8.50		9.00		8.00	
Luckey, Ohio[6]	11.50	8.50	8.50					1.50[3]
Milltown, Ind.		8.50@10.00		10.00[8]			8.50[22]	1.35[10]
Scioto & Marble Cliff, O.		8.50	8.50	9.50	8.25	.62½	7.50	1.50[9]
Sheboygan, Wis.		11.50			9.50			2.00[4]
Wisconsin points[6]		11.50					9.50	
Woodville, Ohio	11.50	8.50	8.50	12.50	9.00	11.00[9]	9.00	1.50[3]
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Texas							7.00	
Frederick, Md.		9.00	9.00	9.50	7.50	9.00	7.50	9.00
Graystone, Ala.	12.50	10.00		12.50		1.40[14]	8.50	1.50
Keystone, Ala.		10.00	8.00	10.00	8.00		8.00	1.50
Knoxville, Tenn.	20.25	9.00@10.00	9.00	9.00			8.50	1.50
New Braunfels, Tex.	18.00	12.00	10.00	12.00	10.00		9.50	
Ocala, Fla.		11.00	9.00				10.00	1.40
Saginaw, Ala.	12.50	10.00	9.00	10.00			8.50	1.50
WESTERN:								
Kirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Los Angeles, Calif.	19.00	19.00	14.00		16.20		12.50	2.50
Dittlinger, Tex.		12.00@13.00					9.50[8]	1.50[23]
San Francisco, Calif.	20.00	20.00	13.50	21.00			14.50[30]	2.15
Tehachapi, Calif.[13]	17.00	15.00	12.00@15.00[11]	17.00	16.00		16.00	2.00
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel. [5] 180 lb. [6] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] 180-lb. net barrel, 1.65; 280-lb. net barrel, 2.65. [8] To 11.00 [9] 80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00 [12] To 3.00. [13] Delivered in Sothern California. [14] Per 2 bags of 90 lb. each. [22] To 9.00. [23] To 1.60. [30] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing Sand	Traction
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50
Massillon, Ohio		2.00
Michigan City, Ind.		.30
Montoursville, Penn.		1.10
Ohlton, Ohio	*1.75@ 2.00	*1.75
Red Wing, Minn.		1.00
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50	3.50
Thayers, Penn.		2.25
Utica & Ottawa, Ill.	1.00@ 3.25	.75
Warwick, Ohio		2.00
Zanesville, Ohio		2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel crayons, gross	1.00@ 2.80
Chatsworth, Ga:	
Crude talc, grinding	5.00
Ground talc (150-200 mesh)	10.00
Pencils and steel crayons, per gross	1.50
Chester, Vt.:	
Ground talc (150-200 mesh), paper bags	9.50@10.50
Same, burlap bags, bags extra	8.50@ 9.50
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc (for grinding)	5.00
Ground talc (150-200 mesh), bags	12.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Emeryville, N. Y.:	
(Double air floated) including bags; 325 mesh	14.75
200 mesh	13.75
Glendon, N. C.:	
Ground talc (150-200 mesh), bulk	6.00@10.00
Ground talc (150-200 mesh), bags	8.00@14.00
Pencils and steel crayons, gross	1.05@ 2.00
Blanks, .08 per lb.; cubes	50.00
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.00
Ground talc (150-200 mesh), bags	7.50@16.00
Joliet, Ill.:	
Crude talc	5.00
Southern talc	17.00
Illinois talc	10.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), bags	12.00@15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Columbia, Tenn.—B.P.L. 65-70%	3.50@ 4.50
Gordonsburg, Tenn.—B.P.L. 65-68%	3.75@ 4.25
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00@ 5.50
Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	8.00@ 9.00

Ground Rock

(2000 lb.)

Centerville, Tenn.—B.P.L. 65%	8.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn.—B.P.L. 72.5%	9.50
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton)

Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H.—Per ton,	
Mine run	300.00
Clean shop scrap	25.00
Mine scrap	22.50@24.00
Roofing mica	37.50
Punch mica, per lb.	.12

Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	....	10.50
Brandon, Vt. — English pink, English cream and coral pink	*12.50	*12.50
Brandon grey	*12.50	*12.50
Brighton, Tenn.—All colors and sizes	§3.00	§3.00
Buckingham, Que.—Buff stucco dash	....	12.00@14.00
Chicago, Ill. — Stucco chips, in sacks, f.o.b. quarries	....	17.50
Crown Point, N. Y.—Mica spar	....	9.00@10.00
Dayton, Ohio	....	6.00@24.00
Easton, Penn.—Green stucco	....	12.00@18.00
Green granite	....	14.00@20.00
Haddam, Conn.—Felstone buff	15.00	15.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio—Concrete facings and stucco dash	....	10.00@20.00
Middlebrook, Mo.—Red	....	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	....	5.50@ 7.50
Milwaukee, Wis.	....	14.00@34.00
New York, N. Y.—Red and yellow Verona	....	32.00
Phillipsburg, N. J.—Royal green granite	....	15.00@17.00
Randville, Mich.—Crystalite crushed white marble, bulk	4.50@ 6.00	4.50@ 7.50
Rose pink granite, bulk		12.00
Stockton, Calif.—"Natrock" roofing grits	....	12.00@20.00
Tuckahoe, N. Y.—Tuckahoe white	12.00	....
Wauwatosa, Wis.	....	20.00@32.00
Wellsville, Colo. — Colorado Travertine Stone	15.00	15.00

*Carloads, including bags; L.C.L. 14.50.
†C.L. L.C.L. 17.00.
‡Carloads, including bags; L.C.L. 10.00.
§Bulk, car lots, minimum 30 tons.

Potash Feldspar

Auburn and Topsham, Me. — Color white, 98% thru 140-mesh	19.00
Bristol, Tenn.—Color, white; analysis, K_2O, 6 to 10%; Na_2O, 2½ to 4%; SiO_2, 68 to 78%; Fe_2O_3, 12 to 20%; Al_2O_3, 16.5 to 18.5%; 99% thru 200 mesh; bulk, depending on grade	14.50@18.00
Brunswick, Me.—Color, white; 99% thru 140 mesh, bulk	19.00
Buckingham, Ore.—White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white, bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% thru 60 mesh, bags	16.00
96% thru 150 mesh, bags	28.00
East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; crude, bags, 12.25; bulk	11.05
Pulverized. 95% thru 200 mesh; bags, 19.73@22.00; bulk	18.73@20.70
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; Si_2O, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk	18.00
Crude	9.00
Tenn. Mills—Color, white; analysis K_2O, 10%; Na_2O_3, 3%; 68% SiO_2; 99% thru 200 mesh; bulk	18.00
Crude, bulk	9.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00

Chicken Grits

Afton, Mich. (Limestone), per ton	1.75
Belfast and Rockland, Me.—(Limestone), bags, per ton	10.00
Brandon, Vt.	10.00
Cartersville, Ga.—(Limestone), per bag	2.00
Centerville, Iowa—(Gypsum), per ton	18.00
Chico and Bridgeport, Tex.—Hen	¶9.00
Baby chick, per ton	¶8.00
Danbury, Conn.—(Limestone), bulk	6.00@ 7.00
Easton, Penn.—Per ton, bulk	3.00
Joliet, Ill.—(Limestone), bags, per ton	4.50
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—(Feldspar), per ton	15.00
Gypsum, Ohio—(Gypsum), per ton	10.00
Hartford, Conn.	‡7.50@*9.00
Limestone, Wash. — (Limestone), per ton	12.50
Los Angeles, Calif.	18.55
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton	10.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	10.00
Warren, N. H.—(Mica), per ton	3.85@ 3.90
Waukesha, Wis.—(Limestone), per ton	20.00
West Stockbridge, Mass.—(Limestone), bulk	‡7.50@*9.00
Wisconsin Points—(Limestone), per ton	15.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	9.00
Anaheim, Calif.	10.50@11.00
Barton, Wis.	10.50
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50@13.50
Detroit, Mich.	16.00*
Farmington, Conn.	13.00
Flint, Mich.	¶12.00@17.50*
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00@19.00*
Jackson, Mich.	12.25
Lakeland, Fla.	10.00@11.00
Lake Helen, Fla.	9.00@12.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50a
Michigan City, Ind.	11.00
Milwaukee, Wis.	10.50@13.00*
Minneapolis and St. Paul, Minn.	10.00
Minnesota Transfer	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	16.00@17.00
Portage, Wis.	16.00
Prairie du Chien, Wis.	18.00@22.50
Rochester, N. Y.	19.75*
Saginaw, Mich.	13.50
San Antonio, Texas	16.00
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
Syracuse, N. Y.	18.00@20.00
Toronto, Canada	16.00*†
Wilkinson, Fla.	12.00@16.00
Winnipeg, Canada	14.00

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M., 10 days.

Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	.84¼	3.37
Atlanta, Ga.	....	2.35
Baltimore, Md.	....	2.15@2.25
Birmingham, Ala.	....	2.10
Boston, Mass.	....	2.13@2.23
Buffalo, N. Y.	....	2.20@2.30
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	....	2.24
Charleston, S. C.	....	2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio	.58	2.32
Cleveland, Ohio	....	2.24
Chicago, Ill.	.51¼	2.05
Columbus, Ohio	.57¼	2.29
Concrete, Wash.	....	2.35
Dallas, Texas	....	2.00
Davenport, Calif.	....	2.45*
Davenport, Iowa	....	2.24
Dayton, Ohio	.58¼	2.33
Denver, Colo.	.66¼	2.65
Des Moines, Iowa	....	2.05
Detroit, Mich.	....	2.00
Duluth, Minn.	....	2.04
Houston, Texas	....	2.00
Indianapolis, Ind.	.54¾	2.19
Jackson, Miss.	....	2.30
Jacksonville, Fla.	....	2.20
Jersey City, N. J.	....	2.03@2.13
Kansas City, Mo.	....	1.92
Los Angeles, Calif.	.60	2.40
Louisville, Ky.	.55½	2.22
Memphis, Tenn.	....	2.30
Milwaukee, Wis.	....	2.00@2.20
Minneapolis, Minn.	....	2.12@2.22
Montreal, Que.	....	1.36
New Orleans, La.	....	2.07
New York, N. Y.	....	1.93@2.03
Norfolk, Va.	....	2.07
Oklahoma City, Okla.	....	2.46
Omaha, Neb.	....	2.36
Peoria, Ill.	....	2.22
Philadelphia, Penn.	....	2.11@2.21
Phoenix, Ariz.	.76½	3.06
Pittsburgh, Penn.	....	2.04
Portland, Colo.	....	2.80
Portland, Ore.	....	2.60‡@2.70
Reno, Nev.	....	2.91
Richmond, Va.	....	2.24@2.34
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	....	2.21
Savannah, Ga.	....	2.50
St. Louis, Mo.	.51¼	2.05
St. Paul, Minn.	....	2.12@2.22
Seattle, Wash.	....	2.50†@2.65
Tampa, Fla.	....	2.25
Toledo, Ohio	....	2.20
Topeka, Kan.	....	2.41
Tulsa, Okla.	....	2.33
Wheeling, W. Va.	....	2.12
Winston-Salem, N. C.	....	2.59

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Albany, N. Y.	.43¾	1.75
Buffington, Ind.	....	1.80
Chattanooga, Tenn.	....	2.45*
Concrete, Wash.	....	2.35
Davenport, Calif.	....	2.45*
Detroit, Mich.	....	2.15
Hannibal, Mo.	....	1.90
Hudson, N. Y.	....	1.75
Leeds, Ala.	....	1.65
Lime and Oswego, Ore.	....	2.70‡
Mildred, Kan.	....	2.35
Nazareth, Penn.	....	2.15
Northampton, Penn.	....	1.75
Richard City, Tenn.	....	2.05
Steelton, Minn.	....	1.85
Toledo, Ohio	....	2.20
Universal, Penn.	....	1.30

NOTE—Add 40c per bbl. for bags.

*Includes sacks.
†10c discount, 10 days. ‡10c discount, 15 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	Gauging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ¼x32x 36". Per M Sq. Ft.	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lengths 6'-10'. Per M Sq. Ft.
Arden, Nev., and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	....	....	....	....	11.70u	....	....	....
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50	....	....	13.50	....	....	....
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	....	....	....	....	14.30o	12.30m	....	m9.00@11.00o	....	....	....	....	....
Delawanna, N. J.	....	....	....	....	....	12.50	....	8.25	....	....	14.00	15.00	33.61
Douglas, Ariz.	....	....	6.00	14.50	15.00	....	18.00	....	30.00	....	....	....	....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	....	24.55	20.00	....	....	....
Gypsum, Ohio	3.00	4.00	6.00	7.00	9.00	9.00	19.00	7.00	24.50	19.00	....	15.00	30.00
Los Angeles, Calif.	....	....	7.50@9.50	11.50y	....	....	....	....	....	....	....	....	....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	....	20.00	30.00
Portland, Colo.	....	....	....	10.00	....	....	....	....	....	....	....	....	....
San Francisco, Calif.	....	....	9.00	13.40	14.40	....	15.40	....	....	....	....	....	....
Seattle, Wash.	6.00	10.50	10.50	13.00	....	....	....	....	....	....	....	....	....
Sigurd, Utah	....	....	....	....	....	....	....	....	21.50	....	....	....	....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	....	....	....	....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
(m) Includes paper bags; (o) includes jute sacks; (u) includes sacks; (y) sacks 15c extra, rebated.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	....	....
Cement City, Mich.		5x8x12—55.00¶	
Columbus, Ohio	17.00c@19.00a	....	....
Detroit, Mich. (d)	.16	....	.18
Forest Park, Ill.	21.00*	....	....
Grand Rapids, Mich.	15.00@16.00a	....	....
Graettinger, Iowa	.18@ .20	....	....
Indianapolis, Ind	.13@ .15†	....	....
Los Angeles, Calif.¶	5¾x3½x12—55.00	7¾x3½x12—65.00	
Oak Park, Ill.	20.00	....	....
Olivia and Mankato, Minn.	9.50b	....	....
Somerset, Penn.	.20@ .25	....	....
Tiskilwa, Ill.	.16@ .18†	....	....
Yakima, Wash.	20.00*	....	....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

Cement Roofing Tile

Prices are net per sq. in. carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00
Chicago, Ill.—Per sq.	20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate, Red, Yellow, Gray, and Orange	Green, Blue
French and Spanish†	$11.50	$13.50
Ridges (each)	.25	.35
Hips	.25	.35
Hip starters	.50	.60
Hip terminals, 2-way	1.25	1.50
Hip terminals, 4-way	4.00	5.00
Mansard terminals	2.50	3.00
Gable finials	1.25	1.50
Gable starters	.25	.35
Gable finishers	.25	.35
*End bands	.25	.35
*Eave closers	.06	.08
*Ridge closers	.05	.06

*Used only with Spanish tile.
†Price per square.

Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60

Longview, Wash.: (Stone-Tile)	Per 1000
4x6x12	55.00
4x8x12	64.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 100
5x8x12	7.00
Houston, Texas:	
5x8x12 (Lightweight)	80.00
Pasadena, Calif. (Stone Tile):	Per 100
3½x4x12	3.00
3½x6x12	4.00
3½x8x12	5.50
Tiskilwa, Ill.:	Per 100
8x8	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	Per 1000
3½x6x12	50.00
3½x8x12	60.00
Prairie du Chien, Wis.:	
5x8x12	82.00
5x4x12	46.00
5x8x 6 (half-tile)	41.00
5x8x10 (fractional)	82.00
Yakima, Wash. (Building Tile):	
5x8x12	.10

Cement Building Tile

Cement City, Mich.:	Per 100
5x8x12	5.00
Grand Rapids, Mich.:	
5x8x12	8.00
5x4x12	4.50

Cement Drain Tile

Graettinger, Iowa—5 to 36 in., per ton	8.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	8.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	....
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Forest Park, Ill.	....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50@65.00
Milwaukee, Wis.	14.00	30.00
Mt. Pleasant, N. Y.	....	14.00@23.00
Oak Park, Ill.	....	42.00
Omaha, Neb.	18.00	30.00@ 40.00
Pasadena, Calif.	10.00	....
Philadelphia, Penn.	14.75	20.00
Portland, Ore.	17.50	23.00@55.00
Mantel brick—100.00@150.00		
Prairie du Chien, Wis.	14.00	22.50@ 25.00
Rapid City, S. D.	17.00	25.00@ 40.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	....

*40% off List.

Alabama Portland Reduces Cement Prices at Birmingham

THE Alabama Portland Cement Co., a subsidiary of the International Cement Corp., announced a reduction of 20 cents a barrel in the mill base price of cement at its Birmingham plant, effective December 5. J. W. Johnston, vice president of the Alabama company, who made the announcement, said:

"This reduction has been made in an effort to protect the Alabama company's trade and its dealers against an unsettled condition that has been created throughout the territory served by the Birmingham mill, largely through the introduction of foreign cement.

"This foreign cement is manufactured under conditions unacceptable to American standards of living which allow it to unfairly compete with the domestic product. Its sale here is in effect an evasion of our immigration laws and its introduction at the ports has had the effect of unsettling the industry throughout the entire territory.

"While this reduction is a serious sacrifice and is made primarily to protect the cement company's dealers, we believe it will materially benefit producers of domestic coal, power, cotton, explosives and the railroads, and it is hoped it will correct the present highly unsatisfactory conditions within the industry."

Ample Supply of Open-Top Cars

CAR EQUIPMENT is in the best condition ever reported and indications are that freight will move uninterruptedly the rest of this year, according to the Car Service Division of the American Railway Association. The report states in part:

"Loading of sand, stone and gravel also has been the highest on record so far this year, exceeding by 6.6% the corresponding period last year.

"With the lake program practically completed and with decreasing loading of sand, stone and gravel, due to seasonal conditions, there should be no difficulty in adequately taking care of the requirements for open-top cars for the fall and winter months."

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.	15.00 per ton																
Graettinger, Iowa	.04½d	.05½	.08½	.12½	.17½	......	.40	.50	.60	.70	......	......	......	......	......	......	......
Grand Rapids, Mich. (b)																	
Culvert pipe	......	......	......	.60	.72	1.00	1.28	1.60†	......	1.92	2.32	3.00	4.00	5.00	6.00	......	......
Sewer pipe (d)	......	......	......	......	......	.63	......	.60†	......	......	......	.58	......	......	......	......	......
Houston, Texas	......	.19	.28	.43	.55½	.90	1.30	......	1.70†	2.20	......	......	......	......	......	......	......
Indianapolis, Ind. (a)	......	......	......	.80	.90	1.10	1.30	......	......	1.70	......	2.70	......	......	......	......	......
Longview, Wash.	Sewer pipe 40% off list; culvert—list																
Mankato, Minn. (b)	......	......	......	......	......	......	......		......	1.50	1.75	2.50	3.25	4.25	......	......	......
Newark, N. J.	6 in. to 24 in., $18.00 per ton																
Norfolk, Neb. (b)	......	......	......	.90	1.00	1.13	1.42	......	......	2.11	......	2.75	3.58	......	6.14	......	7.78
Olivia, Mankato, Minn.	12.00 per ton																
Paullina, Iowa‡	......	......	......	......	......	......	......	2.25	......	2.11	......	2.75	3.58	......	6.14	......	7.78
Somerset, Penn.	......	......	......	......	1.08	1.25	1.65	......	......	2.50	......	3.65	4.85	7.50	8.50	......	......
Tiskilwa, Ill. (rein.)	......	......	......	.75	.85	.95	1.20	1.70	......	2.00	......	2.75	3.40	......	6.50	......	......
Wahoo, Neb. (b)	......	......	......	......	1.00	1.13	1.10	[illegible]	......	1.90	......	2.25	3.40	......	5.50	......	......
Yakima, Wash.							1.42	......	......	2.11	......	2.75	3.58	4.62	6.14	6.96	7.78
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.75	......	......	......	......	......	......	......	......	......	......

(a) 24-in. lengths; (b) Reinforced; (d) Eastern clay, list. 72% and 60% off.
†21-in. diam. ‡Price per 2-ft. length.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Patent for Cinders, Cement and Water for Making Blocks Is Invalid

U. S. District Court Decides Case of Crozier-Straub, Inc., and Concrete Specialties Co., Plaintiffs, v. Thomas Graham and Atlantic City Building Block Corp., Equity; Same v. Jacob Melmod, Equity No. 1520; Same v. Robert G. Downer

PATENT 1212840 with claims for building blocks composed of cinders, cement, and water was held invalid and was also held not infringed by building blocks composed of sand or lime with the added above ingredients.

Cooper, Kerr and Dunham, Charles M. Clarke, John C. Kerr, and Thomas J. Byrne for the plaintiffs. Walter Biddle Saul, Allen S. Olmstead and Joseph G. Denny for the defendants. Charles W. Letzgus for Downer.

The full text of the opinion of Judge Bodine is as follows:

These three suits were tried together. They are actions brought on the equity side of the court for infringement of the Straub patent No. 1212840 granted January 16, 1917, held valid Straub v. Campbell, 250 Fed. 570. The record here is quite different from the record below in that case.

Invalidity of Patent Reversed on Appeal

The case of Straub v. Campbell was tried before Judge Off. He held the patent invalid, but the Circuit Court of Appeals reversed the decree of the District Court.

Counsel for defendant, for some reason, did not offer in evidence the Patent Office file wrapper, the prior art patents or the testimony of an expert. Different counsel appeared before me and the record is entirely new and distinct.

The decision of the Circuit Court of Appeals defines the scope of the invention in the manufacture of cinder blocks from crushed cinders, cement and water, the run of the grate being used, and held that the block itself had a novel feature, in that boards could be readily nailed upon it without splitting or cracking the block.

The Circuit Court of Appeals said (259 Fed. 571):

"The gist of his invention, for such we think it is, was in taking ordinary furnace ashes and using the whole of that product, without sifting or selection. Straub found that, by taking the whole of the ashes—clinkers, fine dust, and all—and grinding the entire product and mixing it with cement and water, that he was able to produce a new and useful article in the building art."

Entire Run of Grate Comprised in Mixture

And on page 573:

"While the use of cinder groutings in foundations, in walks, roads, and other structures, was old, and while even screened ashes had been used in building blocks, no one before Straub conceived the novel idea of taking the whole ash product—clinkers, and ash alike, half burned and wholly burned, lumps and dust—in fact, the entire run of the grate, and using the whole waste product in its raw state, rolling or grinding the whole mass.

Editor's Note

PROBABLY no cement product has been the subject of so much litigation as so-called cinder-concrete block. Consequently this decision of the U. S. District Court (New Jersey) is of much interest in itself. It is of greater interest to products manufacturers because of the comprehensive review of patent literature it contains.—The Editor.

"So novel was this joint use of the whole ash mass, in connection with cement and water, that the Patent Office granted to Straub the broad claim of:

"'A building block composed of a mixture of coarse and fine coal clinkers and ashes, retaining all the original mass, cement and water.' * * *

"The product Straub gave in his building block is new in make-up and new in function, in that while, like the old block, it is proof against sound, water, fire and electric current, Straub's has the wholly new feature of allowing a nail to be driven in it without breaking, and firmly holding the nail in place.

"It is light of weight, and cheaper than former blocks. It can be broken on nearly straight lines, and he offered to prove, and could presumably have done so, had the testimony been admitted, that the relative tensile strength of his cinder block to concrete block was as 846 to 691."

Royalties Paid on Blocks So Made

Straub took the whole of the ashes, clinkers, fine dust and all—"the run of the grade"—ground them and mixed them with cement and water, making an article that is said to be new in make-up and new in function, in that a nail could be driven in without breaking.

Straub has enjoyed a discreetly complete monopoly in the Third Circuit, and many blocks have been made upon which royalties have been paid.

Straub himself testified (case pp. 82 to 85) that he does not take the run of any grate; that he selects his ashes; that all ashes will not make good block and it is only certain ashes which will make a good block. How he knows what ashes will make a good block he does not state. Nor is he able to tell the relative portions of large and small particles used by him in making a successful block (case p. 98).

There was nothing new in securing the nailability features adverted to by the Circuit Court of Appeals. The plaintiff's expert,

Dr. Conwell, so testified (case p. 470).

Dr. Conwell (case p. 471, etc.) testified that the prior art knew the combination of cement, sand and cinders. It also knew the different strengths and different qualities that were produced by differences in the mixtures. He states that the novelty lies in the substitution of cinder fine aggregate for the sand fine aggregate.

The cinder fine aggregate introduced properties that the sand fine aggregate did not have and tended to destroy, but he also stated that the prior art taught the use of the fine cinder aggregate as well as the use of the coarser cinder aggregate as an expedient towards cheapness—not to obtain any special desirable properties.

Straub obtained desirable properties by substituting for the sand fine cinder aggregate, and in combining cement and water with his crushed aggregate of ashes and cinders from selected grates. The novelty was in taking the whole of the cinder aggregate, coarse and fine, not for economy but for the desirable qualities obtained.

Correspondence with Editor of Trade Journal

In an issue of the *Engineering and Cement World* of April 1, 1918, Straub, the patentee, propounded the following question to the editor:

"Where are the cinder concrete blocks made commercially? What proportion should be used? Will they stand fire test, and is the crushing strength fairly high? F. J. S., New Kinsington, Pa."

To this question he received the following answer:

"We know of no manufacturer of cinder concrete blocks, and see very little reason for their use. They might stand fire a little better than ordinary concrete blocks, if the cinders were well selected and screened and all unburned coal removed; but in any case the crushing strength would be lower with a well-made concrete block."

Such printed matter should not create a monopoly in a building material. The learned editor was not sworn.

No opportunity existed to examine him, and from the fact that he answers questions propounded to him no inference arises as to his capacity or special knowledge. He does say that screening is necessary, and that the crushing strength is lower.

Straub does not screen the cinders. The prior art did not. The crushing strength is greater and not less. Because the editor had not heard of cinder concrete blocks does not mean that there were none.

The question editor of a newspaper might readily state the law to be other than the highest courts determine it to be. In fact, Federal and State courts are not always in accord as to what the common law is in any given jurisdiction.

The voluminous prior art literature before me, but not before the Circuit Court of Appeals, will be referred to at length.

Ingredients Specified in Older Patents

The Popp and Melchior patent No. 344594, of 1886, is for a building block. The ingredients set forth in the specifications, page 1, line 20 et seq., are as follows:

"Ground cinders and ashes, one and one-half bushels; dry slaked lime, 12 lb.; boiled glue, 1 lb.; beach sand, two quarts; plaster-of-paris, one quart; portland cement, two quarts."

There was no separation of the cinder mass stated. The blocks were desirable for inside partitions.

The specifications, page 1, line 65, say:

"Over such a partition a white coat may be laid directly without the use of a first coat, and will dry in a very short time. In such a partition a nail may be readily driven, and the partition will not crack or break out when nails are driven into plastering."

Note that nails may be readily driven and the partition will not crack or break. The patent claims, page 2, line 20 et seq., as follows:

"1. A building block comprising, in combination, cinders, lime and glue, substantially as set forth.

"2. The improved building block herein described, consisting of cinders, lime, glue, sand, plaster-of-paris and cement, in about the proportions stated."

Note that claim 1 is for an all cinder block. Further notice specifications page 1, line 25, call for grinding or crushing the cinders and ashes. Nothing suggests separation of the coarse cinder aggregate from the fine cinder aggregate.

The Heim patent No. 89311, of April 27, 1869, is for a building block. The formula is as follows: Cement or stone-lime and water-lime 1 part; coal ashes and coal dust in equal quantities 4 to 8 parts; 2 lb. of potash to each bushel of cement used. (Note—The portland cement industry has largely developed since 1869.)

The patentee states that the blocks made from the above formula are hard and impervious. The Straub blocks are hard, but cellular rather than impervious (Conwell, case p. 418).

It is not clear why Heim would not secure the cellular characteristic of Straub if the particles of coal ashes were sufficiently large.

The Dreyer patent No. 217205, June 4, 1879, is for a building block. The formula is as follows: Portland cement, 1 part; coal ashes, 3 parts; mineral wool, 1 part. (Note—There is no suggestion in this patent that the coal ashes are separated in any way.)

Ashes of Former Days Differ from Present Cinders

Dr. Conwell states (case p. 414) that the ashes of 1879 are not the cinders of the last dozen years. This is obviously so. But it seems doubtful that Straub should have a monopoly because the residue of combustion in modern furnaces mixed with cement is better than the residue of combustion of less efficient furnaces mixed with cement.

The Shinn patent No. 280679, of July 3, 1883, is for a mixture of four parts coal ashes or cinders and one part cement. The patentee says page 1, line 76: "I am aware that a mixture of coal ashes with lime (or cement) is not broadly new, but hitherto the proportion of ashes proposed has been comparatively small." At page 1, line 73, the patentee says that his material can be used for forming building blocks. The expert limits the disclosure of the patent to a kind of mortar. But it would seem that four parts cinders and one part cement was not so very far from Straub's invention when formed into a block. True, Shinn's block was steam treated, but how can it help Straub to omit this part of the process?

The Ransome patent No. 322559, of June 21, 1885, was for a building block made of purified ashes and lime. Cinders were also used, but the blocks were pressed and not poured.

The Lorenz patent No. 366012, of July 5, 1887, is for an artificial building stone composed of five parts ashes, four parts cinders and one part cement. The patentee says page 1, line 13, et seq.;

"A material has been used for these purposes composed of clear ashes and cement, and also of clear cinders and cement, as well as these materials combined with lime or adhesive substances; but so far as my knowledge extends no one but myself has yet used the compound formed of ashes and cinders with cement."

Dr. Conwell, page 424 of the record, reads into this clear statement of the prior art the use of sand as a fine aggregate with either the ashes and cement or the cinders and cement.

No Use of Sand Shown in Patents

The prior art patents here shown do not disclose the use of sand as a fine aggregate. The patent does not disclose it. It would be useful for the complainants here if those words were read into the prior patents. It would be equally useful for most people in difficulties if their language could be changed to meet each new situation.

In the early days of the English law, conveyancers would not punctuate deeds or instruments of title because it was thought intolerable that property rights should depend upon anything so little as a comma. How foolish it is for a patent novelty to turn upon prior practice if words can be read in where wanted.

In the Lorenz patent No. 509924, of December 5, 1893, the patentee in making artificial stone adds burnt sand to his cinders and ashes.

In the Ransome patent No. 516112, of March 6, 1894, building blocks are made. The patentee claims a patent for the following process:

"The process of making artificial blocks or stone from city refuse, consisting in dividing it into two partitions, to one of which

limestone is added, burning both portions separately, and subsequently grinding the limed portion to fine powder and crushing the other portion into coarse grains, then mixing the two portions together with the necessary quantity of water and molding the mixture into the required shapes."

Materials Used in Various Patents

The Krolman patent, No. 713944, of November 18, 1902, is for a fireproof floor. The patentee places a concrete, between I-beams, composed of 1 part cement and 8 to 10 parts of cinders.

In Brunson patent, No. 770557, dated September 20, 1904, is for an artificial stone consisting of cinders, sand, barytes, cement, lime and water.

The Marsden patent, No. 828041, of August 7, 1906, is for a building block. The patentee uses ground coal, clinkers and ashes as a binder of cement and calcined gypsum. The material can be cut and sawed and worked as timber can be.

The Bitterman patent, No. 1034680, of August 16, 1912, uses coke breeze and cement to form building blocks. The patentee says that nails can be driven in.

The Atterbury patent, No. 1163060, of December 7, 1915, is for artificial stone made of cinders, cement and asbestos fiber. Nails, tacks and screws may be driven therein. The blocks have a cellular texture. The cinders are crushed and screened.

The British patents offered completely anticipate the use of cinders and cement with sand.

The *Engineering News* of May 4, 1905, page 471, says that in concrete work where fiber resistance is an important element in the use of clinkers from steam boiler furnaces for the aggregate is generally considered the best practice. The issue of August 31, 1905, at page 232, says that cinders can be used as an aggregate with concrete, but they must be washed free of foreign particles. Straub says that he cannot use cinders which contain foreign particles (case p. 83).

In the *Cement and Engineering News* of September, 1905, page 171, it says that in Liverpool a new material is being used for building houses, and state "the material used consists of concrete blocks formed from waste crushed clinkers obtained from the city refuse destructor plant."

Cinder Concretes Give Good Results

The "Architect's and Builder's Pocketbook," published 1905, prepared by Frank E. Kidder, speaks of a concrete mixture made of cement and fine cinders and a mixture made of cement and coarse cinders. The cinder concretes, especially the coarse mixture, gave most excellent results. He says: "The highest degree of coherence in the concretes, particularly in the center of the mass tested, was shown by a mixture of one part cement to seven parts of coarse cinders."

In the "Proceedings of the Second Convention of the National Association of Cement Users," held at Milwaukee, January 9 to 12, 1906, page 70, appears the following:

"Cinders are sometimes used for block work; they vary greatly in quality, but if clean and of medium coarseness they give fair results. Cinder concrete never develops greater strength, owing to the porous character and crushability of the cinders themselves. Cinder blocks may, however, be strong enough for many purposes, and suitable for work in which great strength is not required."

The *Engineering Record*, Vol. 63 of 1911, speaks of the use of clinker concrete in the manufacture of molded and hollow building blocks. The proportions used have generally been one part portland cement to six parts crushed clinker.

In an article appearing in the *Concrete Cement Age* of March, 1913, page 153, the construction of a group of 40 houses built for the Delaware, Lackawanna and Western Railroad Co. in Nanticoke, Penn., is described. These houses were built of steam cinder concrete. The article states that "No sand is used, and the proportion is one part of cement to seven parts cinders." Hydrated lime was added to the mixture.

In addition to the prior patents and the references in the trade journals and books to the use of cinder concrete blocks, the testimony upon prior public use is convincing.

Cinder Blocks Made as Early as 1912

Harry W. Bell took the cinders from the plant of the New York Edison plant and also from the big Brooklyn sugar refineries, as early as 1912, and made cinder blocks. Documentary proof shows that these Bell blocks were tested by Harold Perrine, connected with the New York building department, and that the mix used in making the blocks consisted of 3 bbl. of coarse cinders, 3½ bbl. of fine cinders and three bags of portland cement.

Even if Bell first separated the coarse from the fine cinders and then recombined them, he is not doing anything so very different from what Straub is doing under his patent. Straub, of course, claims to take the run of the grate. He testified, however, that some cinders make good blocks and some cinders make poor blocks (case p. 85). It takes some big pieces and some little pieces to make a good block (case p. 89). The mere separation and recombination of the cinders makes no very great distinction. Bell said that the man who mixed concrete for the Perrine tested blocks used his own judgment as to the proper portion of large and fine cinders.

Obviously, Straub does the same thing, becaues he says it takes some big pieces and some little pieces to make a good block and he is not able to tell how many big and how many little pieces make up a good block. Bell does use proportion. The fact that Straub is unable to state the proportion certainly does not invalidate Bell's prior use. The early Bell blocks were not used for a weight sustaining wall. They were used for partitions and for filling around boilers. Since it was a cinder and cement block, I do not see that the weight sustaining quality has anything to do with the matter.

The Bell block was not a large block, but I do not understand that Straub can claim a monopoly on the size of his block. The Bell block had the nailable feature, for which so much was contended in the Campbell case. The sales slips and other documentary proof indicate that the Bell block was marketed.

Could Have Pressed Infringement Suit

David Nyce of Doylestown testified that as far back as 1905 he used cement with locomotive cinders obtained from the Reading railroad, in building a poured concrete factory and in manufacturing cinder blocks. In the poured concrete, sand was used as well as cinders. Of course, there is nothing to establish this prior use except Nyce's testimony.

He was threatened with infringement suit and after he had stated what he had done no action was taken against him, although his place of business is in the state of Pennsylvania. If the testimony were untrue there would have been no difficulty in bringing witnesses to prove Nyce a perjurer, and had Straub's counsel any confidence in Nyce's alleged perjury certainly they could have pressed their infringement suit against him and collected royalties.

Numerous References to Cinder Block in Patent Literature

There are other references in the prior art literature and other patents too numerous to mention. It is obvious from the foregoing that a building block was not new; that a building block made of cinders and cement was probably not new, but even if it were new the defendants in two of the cases before me used sand with their cinders. Certainly they do not encroach upon Straub by so doing. Since the prior art knew the use of cinders, sand and cement, those who now use sand cannot be said to infringe, even though Straub has a monopoly on all cinder cement block made without separating the cinders.

The defendant Melmod does not use sand, but he does use lime and calcium chloride. The prior patents show the use of lime with cement and cinders just as much as they show the use of sand with cinders and cement.

It seems to me the patent is invalid. Had the record before me been before the Circuit Court of Appeals in the prior case I have no doubt their conclusion would have been different.

However, if Straub has anything it is limited, in view of the crowded state of the art, to the precise disclosure of the patent.

The bills will be dismissed.

October 28, 1927.

New Machinery and Equipment

New Double-Roll Type Crusher for Secondary and Finishing Crushing

A NEW type of double-roll crusher, designated as Type E, has been developed by the G. G. Buchanan Co., New York. The new machine is intended for heavy work, the large size rolls handling larger size materials with increased tonnage, the manufacturers say. Essential features claimed for the design are strength, accessibility and simplicity.

A side elevation and end view of a standard machine is shown giving an idea of the construction and design. A sturdy four-piece box frame with machined joints gives the unit stability, the makers say, and four tension rods, two on each side, both above and below the bearings, are used to equalize strains due to crushing. The bearings are extra large and long, fitted with double lubricators which may be operated by hand but are equipped with pressure fittings. The bearings are also removable and interchangeable. Fifty-six springs are used to back up the crushing force of the machine. These springs are adjustable so that any desired compression may be placed upon them, it is claimed.

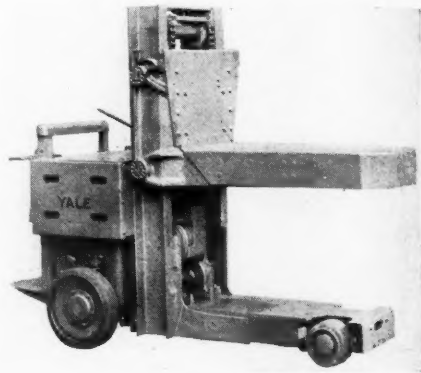
Corrugated, grooved or plain shells made of manganese, chrome or special hard steel are available for use with the rolls. The adjustment for coarse or fine crushing or to compensate for shell wear is by means of removable steel liners placed between the end of the spring bearing and the shoulder of the bed plate. The rolls are made in eight sizes, ranging from 60x24-in. to 78x36-in.

The company has recently issued bulletin No. 140, completely describing these rolls and their application to various crushing problems.

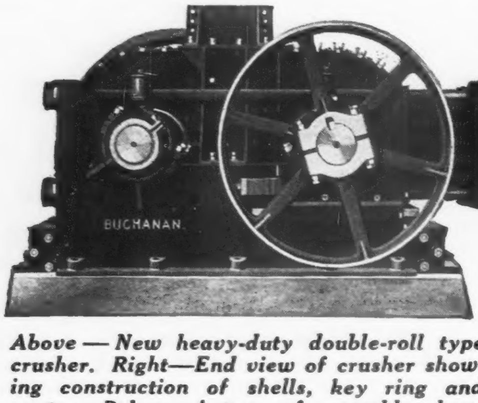
New Electric Lift Truck

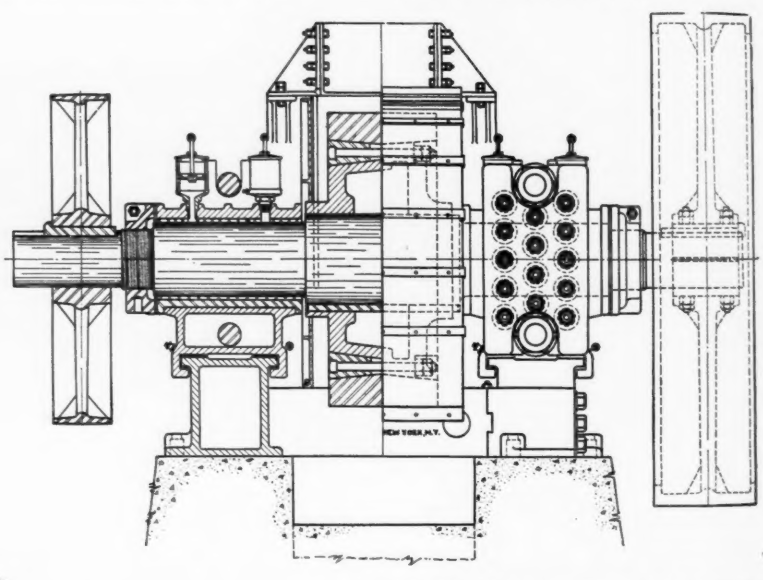
YALE AND TOWNE MANUFACTURING CO., Stamford, Conn., has recently added a new model, K-25 of 3-ton capacity, to its line of electric industrial trucks. Several new features of design, of which anti-friction bearings are an important element, have been incorporated in the new machine.

The backbone of the framework comprises mainly a large gusset plate, ½-in. thick and extending from the very forward end of the truck to the small or trailing

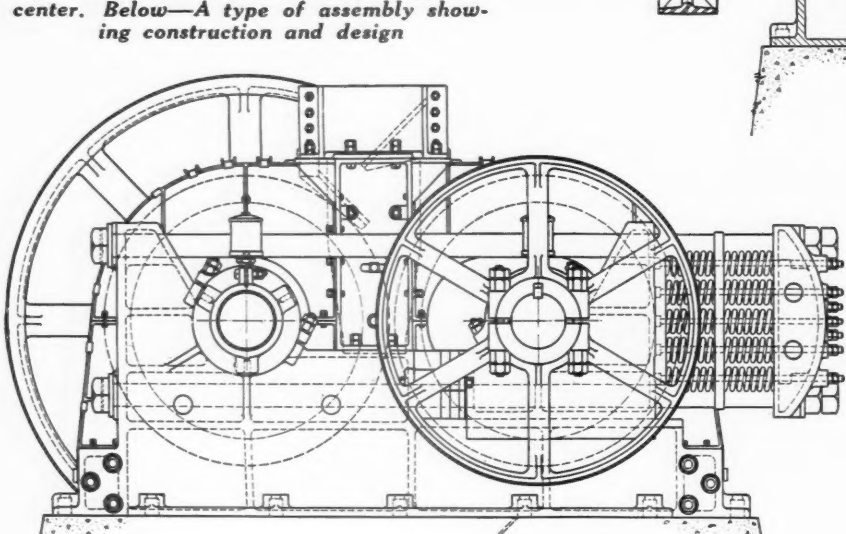


New 3-ton electric lift truck



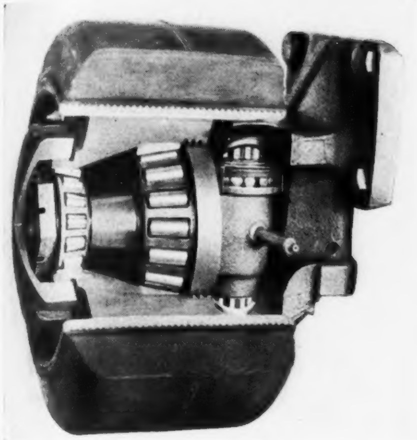


Above — New heavy-duty double-roll type crusher. Right—End view of crusher showing construction of shells, key ring and center. Below—A type of assembly showing construction and design



wheels. This plate is approximately 24 in. in height and provides a yoke to serve as a guide for the drive unit and the spring suspension of the truck. The structural parts of the truck are joined with ⅝-in. and ¾-in. rivets, in order to provide sufficient strength.

The elevating platform is raised and lowered through the medium of a 1½-in. diamond roller chain passing over a power-driven sprocket at the bottom and an idler sprocket at the top. Hyatt "heavy duty" roller bearings are employed in the idler sprocket at the top of the machine. The shifts of the lower sheaves run in a bath of oil, which also serves to lubricate the spur-gear reduction unit. The two ends of the



Roller bearings in rear wheel axle and steering knuckle of new electric lift truck

roller chain are attached to the platform through a spring take-up device, which automatically adjusts itself as the chain wears.

The hoisting motor is connected to the spur-gear pinion through a spring ratchet, so arranged that a positive drive is obtained when raising the elevating platform. Through the roller chain and spur-gear reduction in the hoist unit a speed of 7½ ft. per min. is claimed when lifting a full load, and a speed of 19 ft. per min. when raising the empty platform. The lowering speed is said to be 19 ft. per min. loaded or empty.

The elevating platform of the truck is supported in the horizontal position by four rollers bearing on the inside of the flanges of the vertical ship channels. The rollers are equipped with Hyatt "heavy duty" roller bearings, and with a hardened steel thrust washer to take whatever end thrust may occur when lifting loads that are not placed on the center line of the platform. The platform members are heavy steel castings, having large diameter bosses to support the platform roller pins. The platform has an overall width of 27 in., a height of 11 in. and a length of 54 in. The hoist unit in this position is accessible for any servicing or inspection that may be required.

The main drive unit is of the double reduction spur-gear type, driving the wheels through totally enclosed universal joints. The entire gear reduction with its differential and bearings run in a bath of oil. The steering knuckle king pins have been fitted with ball and roller thrust bearings, which puts the entire weight of the machine on anti-friction bearings. On the small wheels, which come directly beneath the load, the steering knuckle king pins, in addition to being fitted with the roller thrust bearings, are also equipped with an upper and lower roller bearing to take the radial load. These small wheels are fitted with roller bearings on all the moving parts and each wheel assembly contains five bearings. A four-wheel steer feature allows a turning radius of 96 in. to the outside edge of the truck. The battery may be serviced or watered without sliding out the battery and the battery itself can be easily removed, it is said.

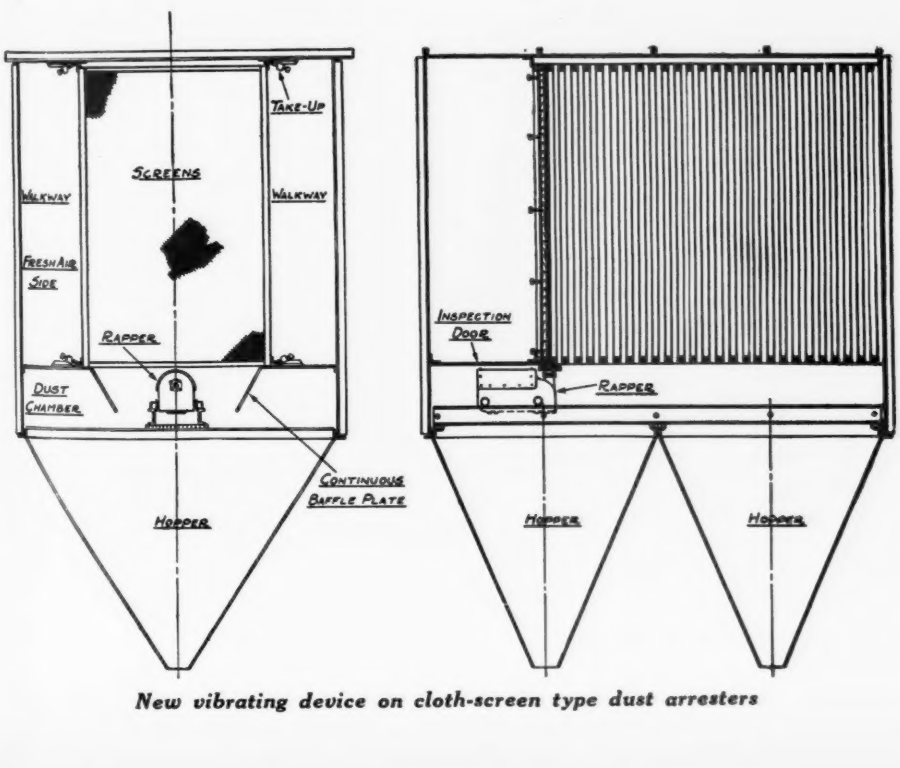
New Dust Arrester Screen Vibrator

A NEW system of vibrating the screens is now being installed on all the large models of "Norblo" cloth-screen type dust arresters manufactured by the Northern Blower Co., Cleveland, Ohio. Through its use, the company claims, material advantages in maintenance and operation result.

The design, for which the Northern Blower Co. has applied for a patent, is radically different from all other previous vibrating devices. As will be seen from the accompanying diagram, it consists of a single electrically operated rapper which travels slowly on rails from end to end of the screen gang, vibrating each individual screen as it passes under it. The single rapping piston necessary is constructed in substantial manner, ball bearings being provided throughout the device, and all parts protected from the surrounding dust by a cast-iron case. All bearings are packed with a good supply of grease, and the device guaranteed by the makers to work without any attention or replacement of parts for at least one year from the date of its installation.

The operating motor is fed from a pair of trolley wires by means of a double collector arm and drives the spring rapping piston through a bevel reduction gear. The gear-shaft carries a cam which operates the rapping piston against the action of a powerful spring, thus giving a rapid succession of upward blows to the under side of the screen gang frame. At the same time, the entire mechanism is driven slowly along by means of a steel worm and wheel. The entire equipment, including the rails, is protected from the weather by air-tight case.

The sequence of operations is as follows: The attendant shuts off the exhaust fan and then presses a push button which starts up the rapping and traveling mechanism of the screen vibrator. When the vibrator reaches the further end of its travel, it automatically engages with a reversing relay switch and commences to return to its starting position. On reaching its original point, it automatically shuts off the current and stops. The exhaust fan may then be restarted, although for the most effective cleansing of the screens it is advisable to allow the dislodged dust to settle into the hoppers below the screens for a few moments.



New vibrating device on cloth-screen type dust arresters

Take Over Foundry Sales

THE Mundy Sales Corp., New York City, announce that it has secured exclusive sales rights for the entire line of the Dobbie Foundry and Machine Co., Niagara Falls, N. Y. This consolidation of sales efforts is considered to be a most advantageous one to both companies inasmuch as the Dobbie line is comprised of derrick fittings, etc., and the Mundy Sales Corp. has also exclusive sales rights for the J. S. Mundy Hoisting Engine Co., manufacturers of gas, steam and electric hoists.

The Dobbie Foundry and Machine Co. was incorporated in 1892 by John Dobbie, who has been since active in the development of the business and as a successor to Archibald Dobbie of Thorold, Ont., established in 1862. Both companies are reputed to be among the oldest manufacturers in their respective lines, the Mundy Hoisting Engine Co. having been founded in 1869 by the late J. S. Mundy. Original patents of the friction drum were obtained by Mr. Mundy in 1875. The Mundy Sales Corp. was organised late in 1925.

News of All the Industry

Incorporations

Coppia Gravel Co., Wilmington, Del. $200,000.

Brouillet Sand and Gravel Co., Ltd., Montreal, Canada. $30,000.

Waterford Sand and Gravel Co., Ltd., Toronto, Canada. $250,000.

Plymouth Stucco Co., Philadelphia, Penn. 50 shares no par value. To deal in building material. C. J. Stewart, Overhill Rd., Ardmore.

International Bitumen Co., Ltd., Edmonton, Alberta, Canada. To develop bituminous sand deposits.

Lennoxville Brick and Tile Co., Ltd., Quebec, Canada. $200,000. To manufacture and deal in brick, tile, concrete products, stone, etc.

Crystal Sand and Gravel Co., Battle Creek, Mich. $50,000 and 100 shares no par value. J. B. Sperry, H. W. Miller and N. A. Cobb.

Child-Heath Sand Co., Bridgeton, N. J. 5000 shares common stock. Douglas V. Aitken, Bridgeton.

R. and L. Concrete Machinery Co., Kendalville, Ind. $45,000. H. J. Grosvenor and Nellie L. Grosvenor of Fort Wayne, Ind., and H. L. Grosvenor of Kendalville.

Western Limestone Products Co., Wilmington, Del. 50,000 shares, no par value. To deal in limestone and limestone products. T. L. Croteau, T. L. Fray, Alfred Jervis of Wilmington.

Livingston Sand and Gravel Co., Newark, N. J. 2500 shares, no par value. H. G. Hendricks and Florence K. Hendricks of Milburn, N. J., and Frank O. Grubel, Paterson, N. J.

Florida Sand Corp., Bartow, Fla. $500,000 divided into 5000 shares of $100 each. To deal in sand, lime, rock and mineral substances. S. D. Gooch, M. E. James and B. C. Wilson, board of directors.

American Traverstone Co., Milwaukee, Wis. 10,000 shares common stock at $1 each, and 1000 shares preferred stock at $100 each. To manufacture and deal in imitation slate, travertine stone, ornamental plaster and cement casts and to install same. W. M. Culp, Hugo Effenberger and Wm. Dressen.

Gypsum Products Corp., Seattle, Wash., granted a license to transact business in Oregon. The company is capitalized at 3000 shares no par value common stock and 1000 shares preferred stock par value $100 each. Will engage in manufacturing and the distribution of plaster board, plaster lath, etc.

Quarries

Erie Stone Co., Toledo, Ohio, has made C. W. McKee of Huntington, Ind., its agent for Indiana.

France Stone Co., Toledo, Ohio, is reported to be investigating property near Montpelier, Ohio, with the intention of opening a stone quarry there, according to the "Fort Wayne (Ind.) Journal."

Brownell Improvement Co., Chicago, Ill., has purchased an entire city block at 75th St. and Oakley Ave., Chicago, to be used as a material yard. A small office is to be placed on the property.

Sand and Gravel

Indianapolis Sand and Gravel Co., notice of the incorporation of which was in "Rock Products" for October 29, has commenced operations at White River and South Harding St., Indianapolis, Ind.

California Development Co., Smithflat, Calif., struck a good quality gravel in sufficient quantity to be worth removing, in its mine at Smithflat recently. Electrical machinery is being installed.

Wolf Creek Sand and Gravel Co., St. Louis, Mo., has shut down its plant at Delight, Ark., for an indefinite period, according to a report in the "Little Rock Democrat."

Cement

Georgia Portland Cement Corp., Augusta, Ga., has announced plans to start work within 60 days on its new plant to manufacture a new type of quick-hardening cement. H. K. Ferguson Co., Cleveland, Ohio, are the engineers.

Ocala, Fla.—Charles S. Thompson, 520 Walnut St., Philadelphia, and his associates are negotiating with the Cowham Engineering Co. of Chicago for a survey of 1740 acres of land at Ocala for possible development as the location of a cement plant.

Atlas Portland Cement Co., New York, has transferred L. J. Boucher, quarry superintendent of its Hannibal, Mo., plant, to its large mill at Northampton, Penn., and has promoted V. V. Jones, assistant superintendent, to the position of quarry superintendent.

Valley Portland Cement Co., Los Angeles, Calif., has been investigating limestone deposits in Tulare county, California, with the idea of establishing a quarry and plant there. Dr. W. R. Robson of W. R. and Edward Robson, bankers of London, England, recently inspected the property, and it is possible that English capital may be used to finance the project.

North American Portland Cement Co., Albany, N. Y., has let contracts for equipment for a waste heat plant at its mill at Security, Md., to the Edge Moor Iron Co., Edge Moor, Del., Foster-Wheeler Corp., New York City, and Greene Fuel Economizer Co., Beacon, N. Y., and also let the contract to J. R. Ferguson Co., Hagerstown, Md., for building. General Electric Co., Schenectady, N. Y., was awarded the contract for electrical equipment and the Worthington Pump and Machinery Corp., New York City, was given the contract for condensing equipment. W. K. Mitchell and Co., Philadelphia, was awarded the piping contract. The total cost of the new waste heat plant will be about $700,000.

Cement Products

Hollywood Art Tile Co., Los Angeles, Calif., will erect a factory at Santa Ana Heights, near Santa Ana, Calif.

A. B. Manry, Norfolk, Va., is planning the establishment of a concrete products plant at Ocean View Station, Norfolk.

Imperial Block Co., Cedar Rapids, Iowa, is building an additional shed at its plant to cost about $2000.

Roylart Stone Co., Los Angeles, Calif., has established a plant at 3571 South Figueroa St. Andrew King and W. H. Brodie are the owners of the company.

Stucco Products, Ltd., Leaside, Ont., Can., has taken over the Canadian Pozzolana Co. of Leaside and will continue the manufacture of pozzo stucco mortars. Allen Grey is president of the company.

Lewis County Concrete Products Co., Centralia, Wash., has leased property in Chehalis, Wash., and contemplates the construction of an additional plant there within a short time. Tom Stoy is manager of the company which was recently incorporated as a subsidiary of the Concrete Pipe Co. of Seattle.

Lime

Peirce City Lime Co., Peirce City, Mo., is planning the installation of additional equipment at its plant.

Gypsum

Canada Gypsum and Alabastine, Ltd., Paris, Ontario, Canada, held its first stockholders meeting recently. This company was formed a short time ago by the amalgamation of the Alabastine Co. of Paris, the Ontario Gypsum Co. and the Toronto Builders' Supplies, Ltd. R. E. Haire of Paris was made president and managing director; C. R. Whitby, Paris, was made vice-president, and S. H. J. Reid was elected secretary-treasurer.

Standard Gypsum Co., Long Beach, Calif., has chartered a Japanese freighter of 8000 tons to carry a full cargo of gypsum from its plant at San Marcos Island, Mexico, to a port in China.

Spokane Fuel and Gas Co., Spokane, Wash., plans an addition to its plant to cost $5000 for combining of coal gas ammonia and gypsum to produce ammonia sulphate fertilizer. The plant will produce approximately 15 tons a month and will be the first plant of its kind in the United States.

Talc

Ganim Mining Co., Redding, Calif., has leased their deposit of talc two miles east of Whiskeyton, Calif., to Ekstrom and Harker of San Francisco. A royalty of $1 per ton is to be paid to the Ganim company on all talc removed. The San Francisco firm will start operating at once.

Agricultural Limestone

Chemical Lime Co., Bellefonte, Penn., is planning to enlarge its plant for making agricultural ground limestone. The addition is expected to be completed by the first of the year.

Falls City, Ore.—Plans are being formed to build a lime plant at Falls City to supply agricultural lime to users in the Willamette valley and in southern Washington, according to A. A. Mucks, mayor of that city.

Godfrey Marble and Tile Co., Atlanta, Ga., has leased 3000 acres of limestone deposits in Randolph county, Georgia, which it plans to develop immediately. Stone will be shipped to Atlanta for finishing, at present, and all broken pieces and quarry wastes will be ground into agricultural lime. The company will construct a railroad three miles long to reach to the new deposits.

Michigan Limestone and Chemical Co., Rogers City, Mich., recently shipped a train load of agricultural lime from its agstone plant at Buffalo, N. Y., to Coudersport, Penn., for use on the farm of Potter county. A limestone day celebration was held on November 30 when the lime arrived, and the Michigan company gave away 30 tons of stone in prizes. The Eulalie Milling Co. of Coudersport will distribute the stone.

Miscellaneous Rock Products

Keystone Phosphate Co., Paris, Idaho, plans the erection of a mill for grinding phosphate to be used on the soil, and also a mixing and power plant.

Norristown Magnesia and Asbestos Co., Norristown, Penn., of which Thos. Jenkins is superintendent, plans a $100,000 factory and warehouse on Washington St. east of Ford St.

Delmos Mines, Montbray, Quebec, Canada, discovered a feldspar dike on their property recently. The dike is 8 ft. thick and is well mineralized with finely disseminated chalcopyrite and pyrite.

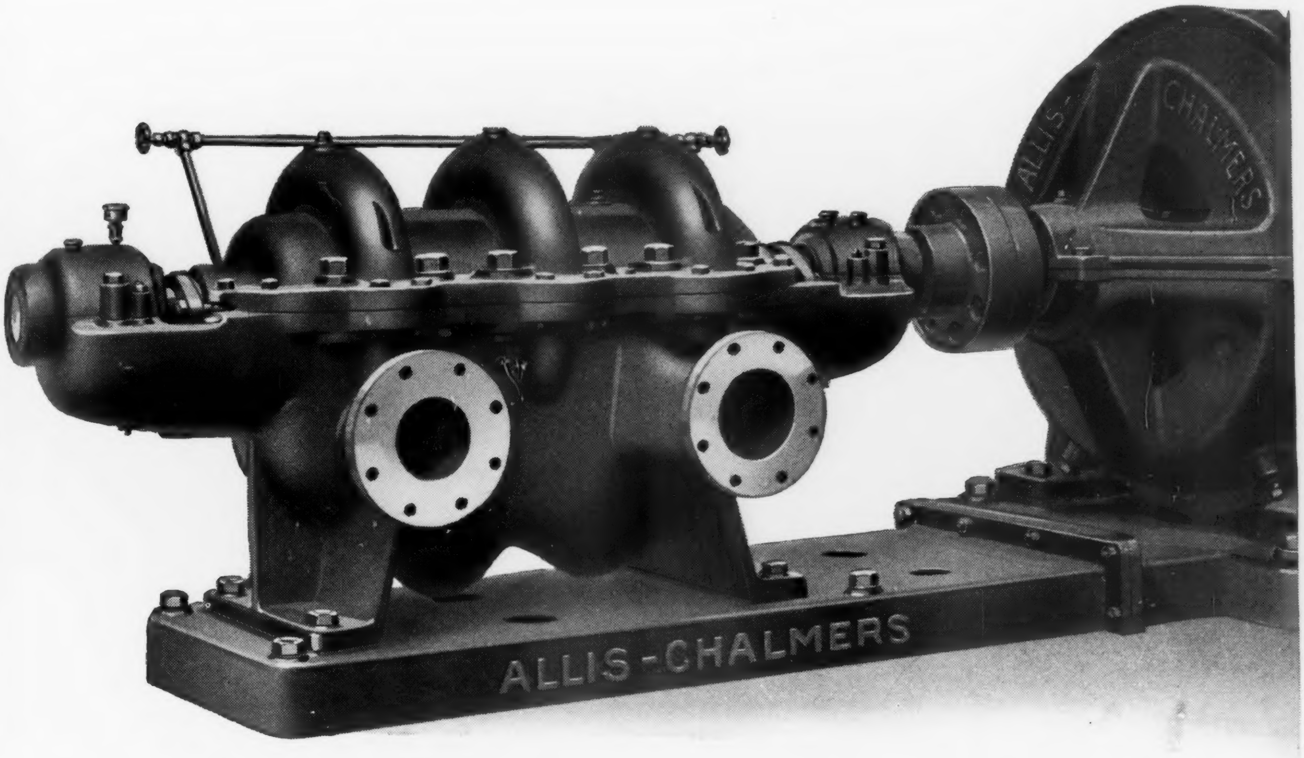
Potash Export Corp., New York, N. Y.—The field agents of the corporation met at Purdue University, Lafayette, Ind., November 19 to 21, for a discussion of experimental work on potash and other fertilizers. The meeting was held in conjunction with the Purdue experimental station.

Dr. J. E. Teeple, chemist for the American Potash and Chemical Co., has been investigating deposits at a lake of potash in California, known as Searles Lake, and he reports that there is enough potash deposited there to serve the United States for many years.

Personals

H. W. Hardinge, president of the Hardinge Co., York, Penn., was awarded the Edward Longstreth medal by the Franklin Institute for the invention of a rotary air classifier, known as the Hardinge reverse-current air classifier.

Comfort E. Brown and E. D. Rogers of the Merco Nordstrom Valve Co., San Francisco, Calif., managers of the eastern and southern districts re-



The Modern Multistage Pump

No simpler or more efficient centrifugal pump has been built than the Allis-Chalmers single stage, double suction, horizontally split, volute casing Type "S" pump. The same desirable features of simple volute diffusion passages, double suction impellers minimizing end thrust, and substantial split casing solidly bolted together are now offered in the Allis-Chalmers Type "M" double suction multistage pump. The high efficiency and other desirable characteristics of this improved multistage pump make it the most suitable for heads higher than can be obtained with a single stage pump.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

spectively, have been in San Francisco recently conferring with the executives of the company.

George Kirtley

George Kirtley has been appointed western sales manager of the H. K. Porter Co., Pittsburgh, Penn., with offices in the Monadnock building, Chicago. Mr. Kirtley has been connected with the Pittsburgh office of the company for the past five years.

H. J. McDargh, Indianapolis representative of the Portland Cement Association, has been named secretary-treasurer of the Indianapolis section of the Indiana Engineering Society.

Thomas R. Preston, a director of the Penn-Dixie Cement Co. and president of the Hamilton National Bank of Chattanooga, Tenn., was recently elected president of the American Bankers' Association.

Obituaries

Llewellyn T. Bachman, consulting chemist for the Pacific Portland Cement Co. of San Francisco, Calif., died on November 19.

Jasper Compton, a director of the Richmond Beach Sand and Gravel Co., and the Central Sand and Gravel Co. of Seattle, Wash., died on November 21 following an illness of six weeks. Mr. Comption was 70 years old.

Charles B. Manville, founder of the Johns-Manville Co., died in Pleasantville, N. Y., on November 27. Mr. Manville, who was 92 years old, was in good health until a few days before his death. He was born in Watertown, N. Y., but moved to Wisconsin where he discovered large deposits of asbestos and established his company. He had retired a number of years ago.

Manufacturers

Celite Products Co., Los Angeles, Cal., has moved its Chicago office to the company's building at 225 East Superior St.

Harnischfeger Corp., Milwaukee, Wis., has established a branch office at Cleveland, Ohio, in the Rockefeller Bldg. J. T. Conners, district manager, is in charge of the office.

Mundy Sales Corp., New York, announces the appointment of the Prues Equipment Co. of Cincinnati, Ohio, as the exclusive distributors for the Mundy line of hoisting equipment and the Dobbie line of steel and wood derricks.

Ohio Locomotive Crane Co., Bucyrus, Ohio, has appointed the Hyman-Michaels Co. of Chicago as sales agent in the mid-west territory for its line of locomotive cranes and traveling cranes and for its subsidiary, the Toledo Crane Co.

Link-Belt Co., Chicago, Ill., will have a complete line of sand and gravel handling machinery at the National Good Roads Show at Cleveland, January 9-13. The equipment will include a crawler crane, grizzly loader and anti-friction belt conveyor idlers.

Blaw-Knox Co., Pittsbugh, Penn., will exhibit their full line of road building equipment at the National Road Show at Cleveland in January, including a 51-ton portable bin with double weighing batchers, a 100-ton pedestal bin, road forms and curb forms, dragline and clamshell buckets, truck turntables, steel batch boxes and a calcium chloride machine.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

New Model Truck. Illustrated announcement of model AK "Bulldog" truck. MACK TRUCKS, INC., New York City.

Pulverizer. Illustrated bulletin on self-contained motor driven pulverizing units with air separation. RAYMOND BROS. IMPACT PULVERIZER CO., Chicago.

G. E. Bulletins. GEA-849. Instructions for ordering magnet frames. **GEA-853.** Solid vs. split gears for haulage motors. GEA-37B. Direct-heat electric furnaces, types AD, RRB and RRC.

Equipment for Railroads. Illustrated booklet on pumps, air compressors, steam condensers and oil engines. WORTHINGTON PUMP AND MACHINERY CORP., New York.

Augur Rotators. Illustrated bulletin on drilling in soft material. **Rotator Rock Drills.** Illustrated bulletin on drilling in medium hard rock. SULLIVAN MACHINERY CORP., Chicago.

Care and Use of Scales. Booklet on the necessary care and proper use of scales to insure accuracy in weighing. BUFFALO SCALE CO., Buffalo, N. Y.

Steam Generation and Combustion Engineering. Bulletin illustrated with diagrams and half-tones on the aims and tendencies of combustion engineering by Martin Frisch. COMBUSTION ENGINEERING CORP., New York.

Kansas Portland Completes 26 Months Without an Accident

ON October 9, the Kansas Portland Cement Co., Kansas City, Mo., a subsidiary of the International Cement Corp., completed two full years without a lost-time accident in its quarry at Bonner Springs, Kan. The good work did not stop when the two years were ended, but has continued to date, making a record of nearly 26 months without an accident. This is certainly a remarkable record for a quarry as large as the Kansas company's quarry, considering the hazardousness of such work.

Quarry crew of the Kansas Portland Cement Co. who have completed 26 months without a lost time accident